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BRUARY 1934 35¢ VOL. 23, NO. 2

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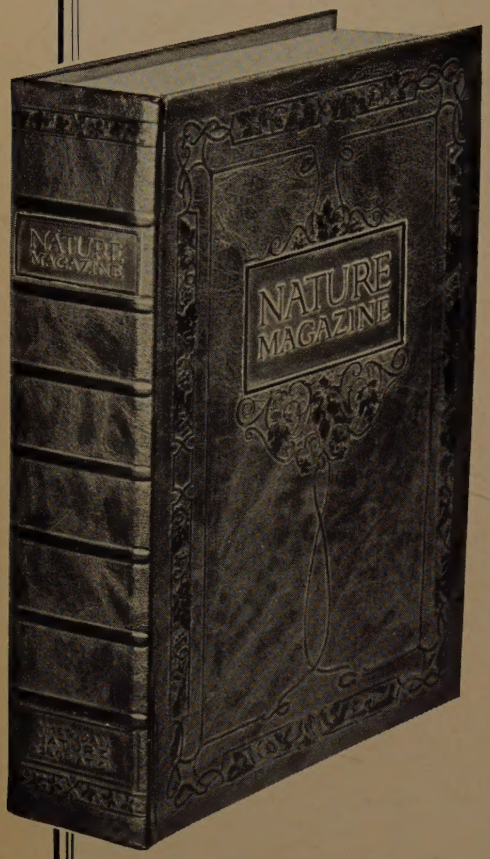

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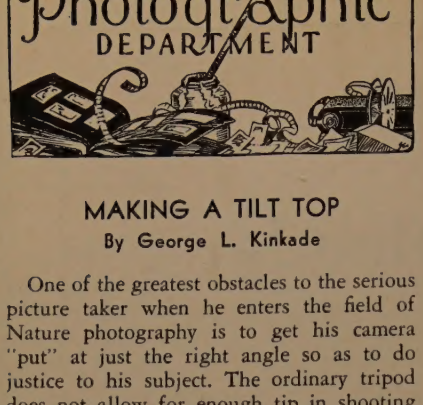
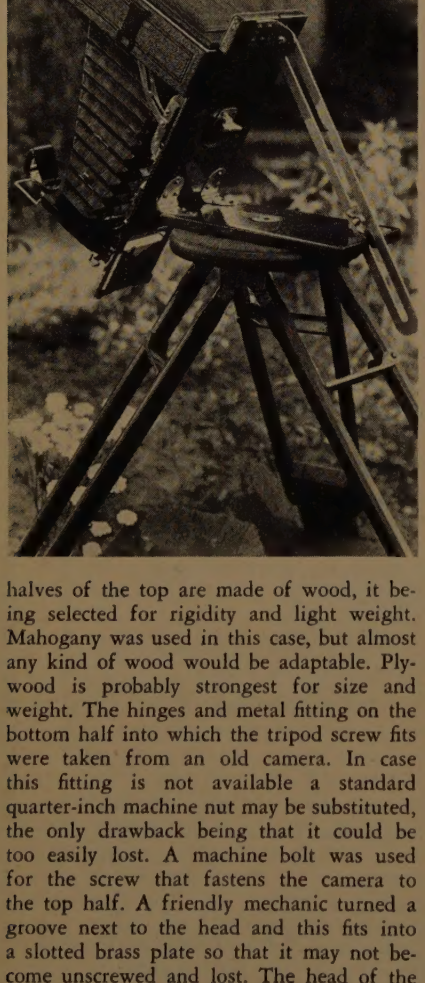


MAKING A TILT TOP

By George L. Kinkade

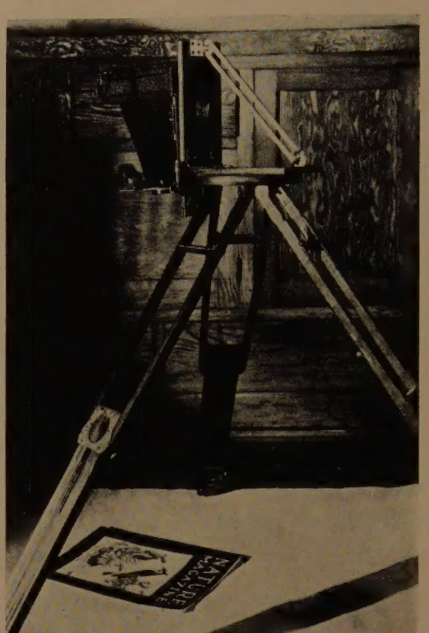
One of the greatest obstacles to the serious picture taker when he enters the field of Nature photography is to get his camera "put" at just the right angle so as to do justice to his subject. The ordinary tripod does not allow for enough tip in shooting down on an object, such as a bed of small flowers, where all are wanted in focus. Tilt tops can be purchased for exactly this purpose, but the average amateur has enough worries paying for his latest camera without indulging in more luxuries. Finding myself in this predicament I undertook the job of making a tilt top, with results more than gratifying. The total cost was ten cents spent for screws and bolts.

As shown in the illustrations the two



halves of the top are made of wood, it being selected for rigidity and light weight. Mahogany was used in this case, but almost any kind of wood would be adaptable. Plywood is probably strongest for size and weight. The hinges and metal fitting on the bottom half into which the tripod screw fits were taken from an old camera. In case this fitting is not available a standard quarter-inch machine nut may be substituted, the only drawback being that it could be too easily lost. A machine bolt was used for the screw that fastens the camera to the top half. A friendly mechanic turned a groove next to the head and this fits into a slotted brass plate so that it may not become unscrewed and lost. The head of the bolt was slotted and a small piece of brass fastened in with a pin. This entire assembly could undoubtedly be purchased in a camera supply house or taken from an old tripod, doing away with needless painstaking work.

The long, slotted brass strip which governs the angle of the top was made by hand, as it was not possible to procure anything like it in small town hardware stores. I am sure, however, that something similar to this could be purchased. If not, the job is far from difficult. A little care plus two or



three tools can work wonders. Size and shape determined, the design is drawn with a sharp tool on the stock, a few holes drilled to get a hacksaw blade through and the slot dressed down to the guide lines with a file. The brackets supporting one end of this strip and the adjusting screw are bent out of fairly heavy brass and securely screwed to the wood sections.

The top board is best covered with a layer of felt and the woodwork can be stained or varnished. If mahogany is used a couple of coats of clear varnish give an attractive appearance that harmonizes nicely with the brass fittings.

No dimensions have been given as sizes of cameras and tripods vary, and the top can be built to individual conditions. Care should be taken in laying it out so that the top will not be hindered by the tripod or camera in its action.

SILHOUETTES

By Hubert Hill

(Courtesy of "American Photography")

Silhouettes, similar to those seen in many magazines at Hallowe'en time, can easily be made at home by anyone possessing a camera, and a desire to create a picture a little bit out of the ordinary.

My interest in silhouettes developed several years ago in a rather unusual manner. The members of a university student organization were planning a Spring festival, in order to raise money for some philanthropic purpose, and one of the committee asked me to suggest ways and means of augmenting the usual money-making schemes, which included booths for the sale of candy, ice cream, and cake, a fish pond, and a fortune teller. In a moment of rashness I offered to make silhouettes and donate the profits, over and above expenses, to the organization. My offer was accepted, and I was appointed the "official photographe of the festival.

Photography has been my hobby f many years. I have photographed my fam singly and in groups, my friends, and ev my friends' friends, dogs, cats, rivers, tre sunrises, and sunsets, but never had I ma a silhouette. Within an hour after I h promised to officiate as the photographer the festival, I was learning to make silho ettes by the only method available—e perience. I requisitioned the assistance three good-looking girls for the purpose experimentation.

The making of a silhouette is a simp matter if the underlying principle is unde stood. Place one pretty girl on a stool ve close to a white sheet stretched tightly ov an open doorway between two rooms. Foc camera on profile of girl against the shee brightly illuminated from behind. Darke room containing camera and subject. Gi a time exposure of from two seconds ten seconds, depending upon the amount illumination, and the ability of the subje to hold still. Develop and print film. Re sult,—one attractive profile in dead blac upon a pure white background, provided a of the little details, such as even illumina tion and freedom from creases in the she have been observed, all of which may b learned by experience. In my particular cas I learned that an exposure of four second was correct for the amount of illuminatio I had behind the sheet, and I have alway used that exposure with similar amounts o light. Attractive results are obtained b placing ferns or flowers immediately behin the sitter, in order to make an attractiv pattern upon the sheet.

I obtained half a dozen good negatives 3¼ by 4¼ inches, on my first trial, an these I enlarged to 5 by 7 inches, and mad an attractive poster advertisement, announc ing that any visitor to the festival coul have similar silhouettes made at the rate o two prints for one dollar. This poster wa placed on the bulletin board and create considerable interest among the students. O the night of the festival I set up my studi in suitable quarters, and announced that was ready for business. Unfortunately I ha provided myself with only three dozen films These were soon exhausted and I had t close my shop. The expenses of the ad venture were only about six dollars, an this left a profit of thirty dollars to th organization. I was pleased to learn late that my experiment proved to be the mos profitable undertaking of the entire festival.

Considerable time was spent in fulfilling my part of the contract. One evening wa devoted to developing the negatives. Tw or three evenings were required to mak the prints, but then—I am an amateur. Pho tography is my avocation. My dark room i either the kitchen or the bathroom, after the dishes have been done and the kiddies hav been bathed and put to bed. My enlarging room is a corner of my study on the third floor, and there are many steps between m enlarging room and the kitchen sink.

Hope and expectation—these are th things that ever enthusiastically keep th amateur pursuing his hobby. Sometimes desert my cameras for months at a time This is usually because of pressing busi ness, but the urge to make a picture is stil within me. A beautiful picture is a joy for ever, and every amateur makes, once in while, a picture which, to him, is beautiful

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OUR COVER

Appropriate to an issue of NATURE MAGAZINE with a distinctly Southwestern flavor is the front cover this month. It shows a typical reptile of the region, the Collared Lizard, *Crotaphytus callaris*. This interesting and colorful fellow is found generally, however, through the Western states and is most abundant in dry, rocky districts. It is pugnacious, greedy and active, living on horned lizards, small flowers such as the blossoms of red clover or dandelion and varying its diet with insects such as grasshoppers, crickets and mealworms. When alarmed it shows its most outstanding characteristic—it will dash away on its hind legs, kangaroo fashion. The specimen from which the artist worked in making our cover picture was twelve inches from nose to tip of tail, so the reproduction is slightly larger than life size. The subject is the male lizard and more colorful than the female.

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OUR ATTITUDE TOWARD WILD LIFE

• • •

FEW ARE THOSE PLEADING FOR ITS PROTECTION

• • •

WHAT our wild life needs most is sympathetic treatment by those who control its fate. By this we do not mean merely being sorry for it, but the application in its administration of the love that is in the heart of the life-long student of Nature—the kind of love that the child has for its dog.

More than once we have read an announcement from a state conservation organization urging its citizens to purchase hunting licenses. For a dollar or two, we are told, one can gain the right to acquire game birds and animals worth several hundreds of dollars. Then there may follow a list of the available species, with the daily and seasonal limits, the supposed value of each individual kind in dollars, and the total calculated value. To the lover of wild life such an appeal is a dreary and discouraging one. One wonders what may be in the minds of the individuals who constitute such a "conservation" commission. And where each licensee is urged to kill the limit when he takes the field, we cease to wonder what chance the game has in a state where the officials intrusted with its care have so little regard for its welfare that they value it only in terms of money. Of course, any thinking person realizes at once that if the invitation were accepted, and if the game could be found in the specified quantities, and if the numbers stated could be killed by each licensee, it would mean the end of all hunting in that state.

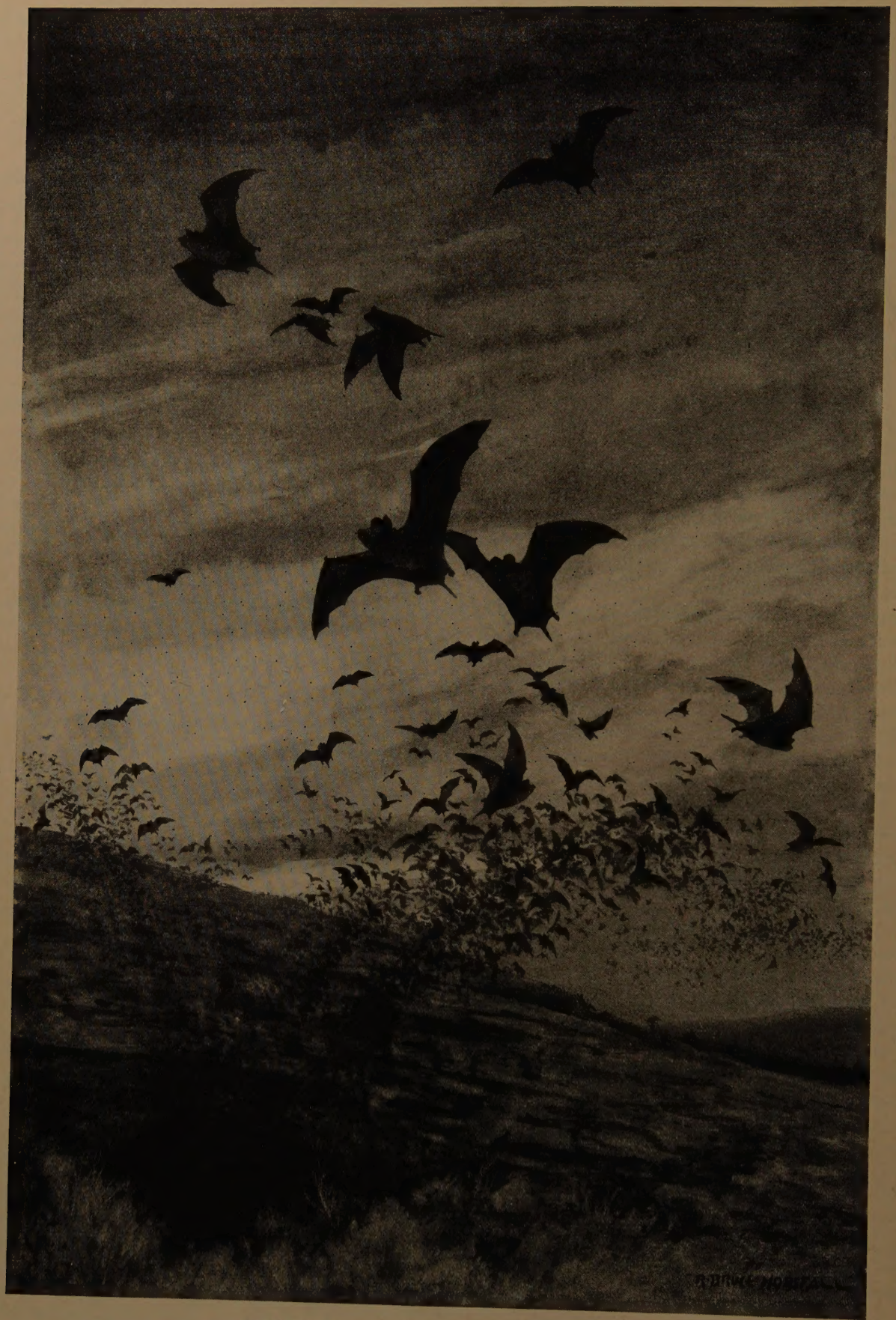
The President of the United States issues a proclamation limiting the open season on waterfowl to one month. His decision is based on continent-wide studies that convince the friends of the birds that a drastic curtailment is necessary. Yet there is an immediate and insistent demand from many sections for a modification of the order, on the ground that waterfowl are still abundant in those particular places. Threats are made that the law will not be obeyed. Federal officials are accused of ignorance and malicious interference with personal rights. Pressure is applied to have the regulations relaxed and modified. Why? Because selfishness is so strongly intrenched in the natures of the gunners that they forget all about their claims that it is the love for the outdoors and not the prospect of killing game that lures them into the open each autumn. When the test comes they remember only the killing.

The Wild Life Committee of Congress holds a hearing to learn the sentiment of conservation officials and hunters regarding the alarming decrease of waterfowl. Scores of representative men gather in the committee room, and each one has opportunity to state his position. One finds that the defenders of the stricken birds can almost be counted on the fingers of one hand. The remainder of the delegates—state conservation officials, shooting club members, ammunition manufacturers and dealers, owners of shooting resorts, renters of boats, merchants selling shooting clothes—all have their say. In short, all conceivable kinds of men who support, or are supported by, the waterfowl industry, as some shamelessly call it, have come to clamor for more killing privileges, or have sent their lawyers as envoys. Forgotten or ignored is the fact that the ducks they shoot were raised a thousand miles away, in another country. It is only their part to strive to retain the privilege of killing the birds for three months each year.

A beautiful grouse, found nowhere in the world save in our semi-arid West, is fighting for its existence. There has been a favorable nesting season, and the broods have fared well. Would not it be well to protect these carefully, that the species be safeguarded? Quite to the contrary, an open season is declared at a period when the young birds have not attained their full powers of flight, on the plea that the sportsmen desire to kill them when they are best to eat. As a result, the stock is nearly exterminated in the states that have taken this heartless step Why should such things be?

What many of our wild life conservation leaders lack is a real love for the creatures placed in their charge. It is not enough that a man may proclaim loudly his devotion to the cause; let the history of his acts tell the story for him. We sometimes hear of a hunter who is so kind-hearted that he saves and cares for the birds he has crippled. But how much kinder to the birds he would be if he had not first broken their bones.

Let us not forget that love for animals is something that does not go along with the assumption of a certain office. It cannot be put on like a garment. It is something that lies deep within the heart, and which is evidenced by deeds rather than words. In childhood it is the heritage of most of us, and with proper care and training, it will thrive and grow. Happiest are those who hold fast to it, for it is one of the most precious things of life.



MEXICAN FREE-TAILED BATS POUR FORTH
AT EVENING FROM CARLSBAD CAVERN

NATURE MAGAZINE

VOLUME 23 FEBRUARY · 1934 NUMBER 2

DWELLERS IN THE DESERT

IN THE ARID SOUTHWEST LIVE MANY FASCINATING MAMMALS

BY VERNON BAILEY

RETIRED CHIEF FIELD NATURALIST, U. S. BIOLOGICAL SURVEY

THE DESERTS are as old as the mountains that cut them off from their share of ocean rains, and their animal life is as old as the deserts. For that reason the animals are highly specialized and differ greatly from those of other parts of the country. Otherwise they could not stand the aridity and extremes of temperature.

Many, if not most, of the small desert mammals and reptiles live their whole lives without ever drinking water; some probably without ever seeing any water. Rains are few and irregular and if water falls it quickly sinks into the ground or dries up. Most of the birds go to water regularly, but the small mammals and reptiles have to find some other way to get along. The thirsty species stay away. That leaves plenty of room and plenty of food for the others, and they have stayed long and prospered wonderfully in this region.

While this issue of Nature Magazine is not a "Southwestern Number" it does contain more than the usual geographical emphasis on one region. This is in recognition of the unique interest that attaches to the flora and fauna of the section. Also, we are privileged to present two articles on this fauna; one on birds by Florence Merriam Bailey and the other on mammals by Vernon Bailey. The Baileys need no introduction to scientists and Nature lovers anywhere. So, besides doing justice to a fascinating part of our country, we would like to dedicate this issue to the lifetimes of contribution by Mr. and Mrs. Vernon Bailey. In so doing we publish two of Mr. Bailey's articles, the second devoted to humane traps, to the development and invention of which he has given countless spare hours.

There are few large mammals in the deserts of our Southwest, and there never have been many since our history began. A few mountain sheep, gray mule deer and antelope have here and there become real desert types and learned to live for long periods without drinking water, but they must have plenty of room for a wide choice of foods of special kinds. Cactuses, century plants, yuccas, sotol, and many other typical desert plants slowly store up water when it rains and protect it with tight skins, thorns, spines, spikes and daggers until the time when the plants can blossom and bear their flowers and fruit or seeds without regard to weather. Some store their food and moisture in roots or bulbs or tubers underground, some in great thick trunks or in spiny heads or branches that keep most animals at a distance, but a few animals have learned to get these stores when needed.

Also there are in the low barren mountain ranges potholes in the rocks, called *tanks* or *tenajas*, where rainwater sometimes stands for months or most of the year, and some of these are known to mountain sheep and mule deer and to the native Indians. So there is some doubt as to how long these animals really go without water.

But the arid Southwest is by no means all desert. Numerous streams bring clear water from the mountains far away and convert fertile-soiled valleys into rich agricultural sections, while the higher mountain ranges catch plenty of moisture on their cold upper slopes. There they produce real forests and hold permanent snowbanks around their peaks. In fact, all the life zones between the Tropics and the Arctic are represented by a great variety of plant and animal life on some of the mountain slopes.

In southern Arizona, the Sonora peccary, the long-nosed *Nasua* or coon cat and the great spotted jaguar represent tropical groups that stray over the border, but their main range lies south of the United States. The beautiful spotted bobcats and the big tawny mountain lions cover the whole region, especially up in the plateau

THE YELLOW-NOSED POCKET GOPHER
One of the many gophers that compete with the farmer in harvesting crops

ROUND-TAILED GROUND SQUIRREL
A plain gray, inconspicuous little desert dweller that is rarely seen

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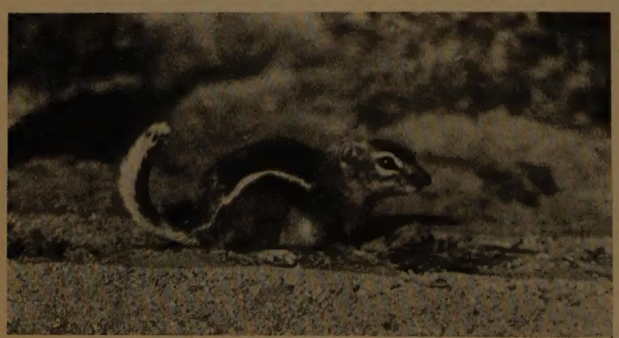


WHITE-TAILED ANTELOPE SQUIRREL
One of the conspicuous little animals of the desert, wrongly called chipmunk

and mountains, where deer, antelope and mountain sheep afford easy prey and an abundant food supply. Stealthy hunters they are and when game is scarce they turn their attention to domestic stock and soon find colts, calves and sheep just as palatable as venison, antelope and bighorn.

Both black and grizzly bears were once common in the cool mountain timber, where water, game, nuts and berries gave them food. But they, too, got into trouble with the ranchers by occasionally developing a taste for beef and mutton, and are rapidly becoming scarce, too scarce many of us think, as they have a real value and interest. In certain places they could be maintained in limited numbers.

The smaller carnivores—coyotes, foxes, badgers—are animals that live on the flesh and blood of other animals and can go for a moderate length of time without water. All are good travelers who keep within a few days' journey of water and generally just make excursions into the waterless parts of the desert. The coyote is the best traveler of the lot and is most often found at long distances from open water. The beautiful little desert foxes usually live within a few miles of some water hole and extend their hunting trips as far away as necessary to find plenty of small game. Badgers go far into the desert and seem fairly independent of a water supply, but even with their short legs they are great travelers, often trotting along a road for many miles in a night, as if going somewhere. All these animals hunt at night and generally spend the hot days in cool, moist burrows, a habit that helps much in conserving their bodily moisture. Also, they are good diggers and in many places know where to get a drink a few feet down in a sandy wash or in the dry bed of a river by burrowing down to water. Many human lives have been saved by following their example.

Raccoons stay close to water, following the shores of the main streams and living in the cliffs and canyon walls, while their relatives, the pretty little ringtails or *Bassariscus,* are cave and cliff dwellers in the canyon country, often coming into camps and cabins to catch mice and rats and sometimes becoming so tame as to be delightful pets.

There are four distinct groups of skunks in the Southwest, all very different except in their choice of perfume. In southern Arizona they are often found inhabiting the same canyons, gulches, or valleys on neutral if not friendly terms. There is the big hog-nosed, or white-backed, skunk, *Conepatus;* the common skunk with two diverging white stripes on the back, *Mephitis;* the hooded skunk, with a crest of white on the back of the head and white stripes along the sides, also a *Mephitis;* and the little spotted skunk, *Spilogale*, with rows of white stripes and spots in a pretty crazy-quilt pattern over the back and sides. They are best known by their fur, which we often recognize in good society, but they have another value as destroyers of small rodents and numerous insects. Also, they are accused of robbing nests of game birds and getting in the way of rapidly passing automobiles, so

their overabundance is not wholly desirable, nor is it likely to be of long duration.

Beavers and muskrats are found along most of the streams, even along the large rivers that flow through arid regions, but their problems mainly involve self protection. Their beautiful soft fur has put a price on their heads that few animals could stand, but under the high banks of deep streams they have been able partly to escape their pursuers and in favored spots are still found in considerable numbers. Fortunately we are coming to realize the value of such animals and efforts are being earnestly made to protect them so far as necessary to keep up a fair abundance in locations well adapted to their aquatic life.

Rabbits of various kinds, especially the long-legged, long-eared jack rabbits, are great desert dwellers because they readily adapt themselves to waterless country. Their food is mainly green vegetation, when there is any, and they get plenty of water by selecting the juicy young plants, young grasses, clovers, or numerous other plants that will carry fifty to sixty per cent moisture. In dry times, when all green vegetation is dried up, they nibble into cactus between the spines and get good food that is sixty to ninety per cent water, or dig down to tubers and bulbs under ground that are sixty to seventy per cent water and good food besides. Their pellets are almost devoid of moisture and their systems are well supplied for all practical purposes with the excess water from their food. Even females nursing young have a copious supply of milk. The bladders of such animals that have not seen a drop of water for months are often found distended with water, and there seems to be no evidence of any suffering or disadvantage in their desert lives. Their thin dry skins do not allow much loss of moisture through perspiration so there seems always to be plenty for all bodily needs.

Of the many species of jack rabbits the most spectacular is the antelope jack, of large size, long ears and legs and striking white sides that flash like the spread signal of the antelope. They are restricted to the deserts of southern Arizona and western Mexico.

There are many little rodents that make up the greatest part of the small animal life of the desert, and these show the most perfect adaptation to arid conditions, both in structure and habits. Most of these are nocturnal, which is a distinct advantage, but the little antelope squirrels or Dixie chipmunks, with short bushy white or gray tails curled over their backs, are distinctly diurnal and often conspicuous characters of the dry washes or valleys. To be sure they do most of their foraging early in the morning or late in the afternoon and so escape the dryest and hottest part of the day. They sleep in deep cool burrows where the air is moist and comfortable and they eat rich oily seeds and some juicy fruit, watery cactus pulp, young plants, or roots that give them plenty of water for all their needs.

Other little plain gray round-tailed ground squirrels and little spotted ground squirrels are diurnal desert dwellers but they breed early in spring, eat heartily and

YAP, YAP, Yiiiiiiiiii

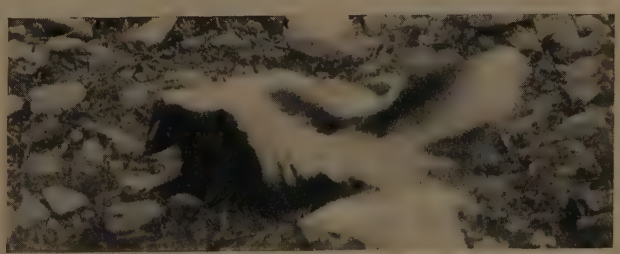
The song of the coyote is one of the wild voices of the desert night

LARGE POCKET MOUSE OF SOUTHERN ARIZONA

A perfect desert dweller, always eager to fill his ample cheek pouches with food

THE ANTELOPE JACK RABBIT

This long-eared fellow is a familiar citizen of the desert, well adapted



THE WESTERN STRIPED SKUNK

One of four species of southwestern skunks often found living near together

BOBCAT OF SAGEBRUSH OR CANYON

A beautiful animal of the Southwest, but often destructive to game and live stock

ROCKY MOUNTAIN MULE DEER

They are still found in the upper regions of the Southwest. A buck in winter coat

get fat before the hottest weather begins and go down into nice cool moist burrows to sleep through the dry hot summer. They aestivate instead of hibernating but their exact physical condition during the long summer disappearance is not well known. Their store of fat under the skin and filling all the bodily spaces is supposed to supply the little moisture as well as food needed for a torpid condition. Apparently they sleep from midsummer to midwinter or later, but they have not been as thoroughly studied as their northern cousins in colder climates.

Colonies of fat little prairie dogs, not dogs at all but big plump ground squirrels, are found where the best grasses grow and often they take so large a share of the grass that the stockmen object. Prairie dogs are good eating too, but most people prefer beef and mutton.

The big plain gray rock squirrels of the foothills and canyons of the southern Rocky Mountain region have a fertile field with generally an abundance of water and rich food of acorns and nuts. The striped mantled squirrels and many species of bright little striped-backed chipmunks are all high country or mountain dwellers, generally in open forest country with an abundance of seeds and nuts for food and where occasional rains or dewy nights insure an adequate supply of water. The big tassel-eared squirrels of the yellow pine plateau country are among our most beautiful members of the squirrel family, the ears in full winter tassels measuring three inches long from base to tip of tassels and the striking color patterns adding spectacular effects. Two distinct forms on the two sides of the Grand Canyon only ten miles apart are strikingly different, the one on the north side with black belly and big white plumy tail, and the one on the south rim with white belly and gray top to the tail, but so similar in structure as to show close relationship. The spruce squirrel of the Canadian Zone spruce and balsam forests is a jolly little relative of our Eastern red squirrel or chickaree.

The little striped-backed chipmunks begin in the foothills with the nut pines and junipers, and other species range higher up in the yellow pine zone and others in the spruces and firs clear up to timberline where the big whistling marmots make their homes among the broken rocks and whistle back and forth at each other. The rock-coneys stack their hay under the slide rocks above timberline and call in nasal *eamp, eamp,* as they busily scamper over the rocks with big mouthfuls of hay.

A few prickly porcupines may be found anywhere in the mountains from the lowest timber to above timberline, and though very timid they are easily tamed and make most interesting pets when you have won their confidence.

Rocky Mountain mule deer and Canadian mountain sheep range around the high peaks of Colorado and New Mexico in summer and migrate to lower levels in winter, their numbers increasing rapidly where they are given adequate protection.

Pocket gophers are legion, both in species and number of individuals, occupying every type of country from the lowest, hottest deserts up by different forms through dif-

ferent life zones to the top of mountains well above timberline. They live underground for most of their lives, making endless tunnels and finding an abundance of rich moist food in the roots and bulbs and tubers encountered below the surface as well as in some green vegetation on the surface, adapting themselves to arid or humid conditions as becomes necessary. For untold ages they have cultivated, mellowed, and improved the soil for man's use, but when man plants his crops the pocket gophers promptly claim their share and it is often a large share. A few potatoes and beets would not matter so much, but when the roots are eaten off a whole orchard of apple, peach, fig, or orange trees there is trouble—for the gopher as well as the farmer.

Most of the small desert mammals are active at night, coming out after dark when the air close to the ground is comparatively cool and moist and going into deep, moist burrows for the daytime, so they never know how hot and dry it gets.

The kangaroo rats and pocket mice are the most highly specialized and perfectly adapted to desert conditions and flourish most abundantly in the driest and hottest of our southwestern deserts. They are a family all by themselves with fur-lined cheek pockets for bringing home their food, with generally long hind legs and tails for rapid travel, and peculiar skulls with hollow air chambers around the ears so they can hear under ground.

Some of the pocket mice are very small, with small feet and tails, and are poor travelers, but most of the kangaroo rats are larger and some are of large rat size with very long tails and hind legs. This is as near as they come to kangaroos, to which they are no more related than they are to true rats.

The big bannertail is one of the largest and most beautiful of the family, with tail and body about a foot long, mostly tail, with a white flag at the tip of it. They run in soaring leaps that seem rarely to touch the ground but in straight lines held true by the long plumed tails.

They are gentle animals with no protection against numerous enemies except their speed and their deep and elaborate underground houses, which are built for strongholds or fortresses as well as for comfortable homes. These houses or mounds, as they generally appear, are even more elaborate and complex than the houses of beavers, muskrats, or woodrats and show either real intelligence or a long course in adaptation to desert climate. The big tunnels wind downwards two or three stories below the surface and the hollow mounds are built up a foot or two above the surface with many store-rooms, nest rooms, feeding rooms and long winding hallways—regular apartment houses. The outside doors and some inside doors are usually closed during the daytime and much of the home life of the bannertails is lived indoors and partly in the basements. In the absence of cooling systems they go deep down into cool damp soil where some of their soft, clean nests are usually found.

Their food consists largely of small seeds of grasses and a great variety of desert plants, carefully selected and brought home in the cheek pockets and packed into neat

LONE ANTELOPE ON THE RANGE

The wariest and fleetest of game animals, now thriving, thanks to better protection

WESTERN YELLOW-HAIRED PORCUPINE

The buds, leaves and twigs of the aspen are a favorite spring food for this fellow

THE LONG-EARED OR JACK RABBIT BAT

One of more than thirty species of bats found in the Southwest, where they keep insect pests in check and serve the farmer. They vary in size from that of moths to the two-foot spread of wing of the great mastiff bat

WHITE-FOOTED MICE OF PRAIRIE COUNTRY

They are timid and nervous little animals, and are strictly nocturnal. They are rarely seen, even in regions where they are abundant. There are many beautiful and interesting little mice to be found in the southwestern desert

store-rooms near the nests, enough to last over a long drought or all winter, until another crop of seeds grow, and often more than can be eaten before a new crop ripens.

These thrifty storers are light eaters and never become fat or hibernate, although in cold or stormy weather they can stay indoors as long as they please and keep their enemies shut out. In pleasant weather they travel far and wide along their well-worn trails and roadways and especially delight in frisking over sand banks and dunes and rolling and rubbing their fur to immaculate cleanliness in dry sand baths.

The little moisture they require is easily obtained from a few green leaves, tender sprouts, or, in time of drought, from little bulbs and tubers easily dug up from below the surface of the soil. They live comfortably, with an abundance of all that their simple lives require. They are gaily dressed, have plenty to eat, ample time for rest and recreation. What more could their simple hearts desire?

Some of the pocket mice are the tiniest of our rodents, and very beautiful—the hummingbirds among mammals. The little Baird pocket mice, of a rich orange gray color and soft as moths, weigh about five or six grams and are as quiet and gentle as miniature rabbits. They store seeds around their nests deep in the ground and the minute amount of water they require is found in bits of green food or green seeds.

The grasshopper mice are perfectly at home in the driest deserts, good hunters, living mainly on insects, grasshoppers, crickets, beetles, scorpions, moths, caterpillars, or other kinds of mice, all juicy food from which they take the moisture stored up by plant-eating insects or other animals. They are real rodents but with the habits of insectivores or carnivores. They occasionally eat a few seeds or a little green food.

White-footed mice of many kinds and great variety are abundant in every type of country from the most arid to the most humid and from sea level up to mountain peaks above timberline, but different species live in different zones, and each is adapted to its chosen climate and environment. They are perfectly at home below sea level in Death Valley, where rocky cliffs afford shelter and seeds and green plants food and water. They are wholly independent of any local water supply. They are quick, nervous, timid little animals with big ears and eyes, as pretty as birds, and some look as if they could fly by spreading their great ears. They are skillful climbers of trees and rocks and canyon walls but have a host of enemies, always ready to gobble them up. That is why they are so nervous and timid and difficult to tame as gentle pets. But they are so prolific that their numbers are legion.

Little harvest mice, and higher up in other zones several kinds of meadow mice, and in every different life zone one or more kinds of wood rats, and here and there a few kinds of cotton rats, help to make up an interesting variety of mammals, all fitting into their own particular types of environment.

And last but not unimportant are great numbers and many species and varieties of bats, our flying hosts of the night, so little known and little appreciated that most people shudder at the mention of them. There are families and genera and species, varying in size from the two-foot spread of wing of the mastiff bat down to the tiny canyon bat smaller than some (Continued on page 98)

GEMS WHICH BELONG TO THE GROUP OF CRYSTALLIZED QUARTZES

Among those present here are rock crystals, milky quartzes, citrines, amethysts and smoky quartzes, all from the treasure chest of our Rocky Mountains

TREASURE CHEST OF AMERICA

SOME GEMS FROM COLORADO AND THE SOUTHERN ROCKIES

BY AUGUST POHNDORF, JR.

THE ANT—that indefatigable archaeologist—has many times brought up from subterranean levels small objects that have led to further discoveries. Have you ever noticed that on the slopes of his labyrinthine home he places bits of shiny glass or rock, or colored stones? In the Southwest you will find tiny pebbles of garnet and peridot and obsidian in his nest. Sometimes, when he excavates his chambers above an ancient grave, he may carry small beads of turquoise or "Indian jet"—made from cut and drilled hard coal—to the surface. When you have examined one of these small beads it will set you to wondering how these ancient craftsmen, with their aboriginal tools, could drill a hole in so small an object.

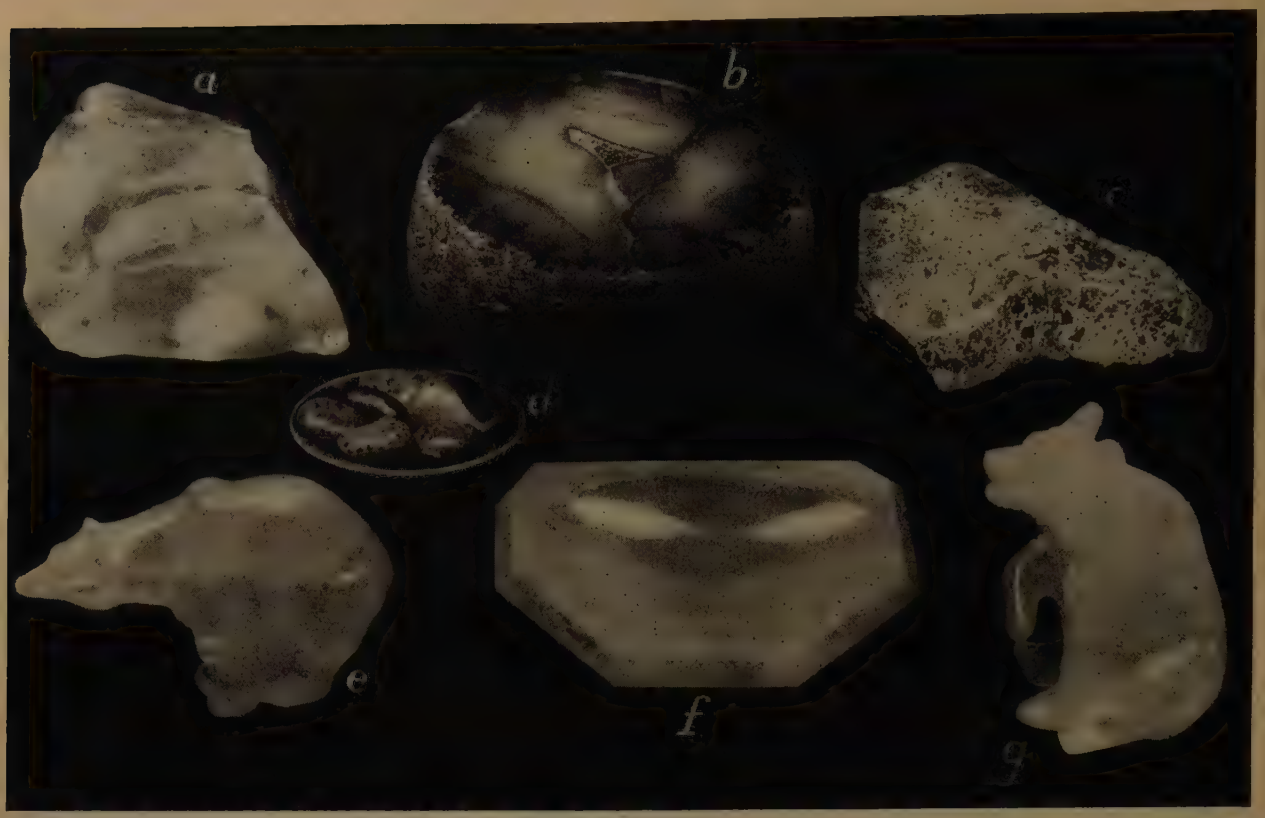
But, while the ant may point the way in certain instances, it is to the prospector and miner that we must give thanks for the great majority of gem discoveries. From Nome to Baja California they have "washed gravel" and sunk prospect holes in likely formations. Not many places have escaped the notice of this inquisitive, searching clan.

In the year of 1849, when the electric cry of "GOLD" ran like an all consuming prairie fire, from California, to the East and South, men from all walks of life started the long trek westward into the setting sun—all California-bound.

After the long and hot journey across the Great Plains, the cool loveliness and virgin beauty of the Rockies won many from their resolve. In this glorious country was everything for the new home—a teeming wild life, streams and rivers with fish aplenty, and over all, in the azure mountain sky, hung a sun whose hottest rays were tempered by the cool breezes from the ice-mantled sentinel peaks. What a haven of blessedness this must have been to those weary, trail-spent men!

Gold was first discovered in Cherry Creek and on the Platte—on the site of the present city of Denver—in 1852. However, it was not until six years later that the great influx to Colorado began. They were the historic, unforgettable "Pike's Peak or Bust" days. By this time big "strikes" were reported from Black Hawk, Central City, California Gulch, Breckenridge, and Idaho Springs. Names to conjure with! The man who "bummed a grubstake" today, was tomorrow's millionaire. Thus began the Golden Era of Mining.

Into the remote gulches and draws went the intrepid and persevering prospector, diligently and hopefully



SOME SPECIMENS OF CRYPTOCRYSTALLINE AND MASSIVE QUARTZ

Taking them in alphabetical order, we have agate, chalcedony, jasper, moss agate, a rose quartz bear, jasper ash tray and another bear of rose quartz

searching out the Madre de Ora—the "Mother of Gold"—the fabled Mother Lode from which they believed all placer or nugget gold to have been derived. The mountain side and the canyon wall echoed and re-echoed to the spang of the miner's hammer and drill. Up the rivers and creeks to their sources went this undaunted tribe of American manhood—often with a gold-washing pan in one hand and a ready rifle in the other.

It is small wonder that in searching so assiduously for gold these itinerant prospectors uncovered many gemstones. Sometimes these "pretty stones" were cast aside as of no worth; but, more often, it was recognized that they had value.

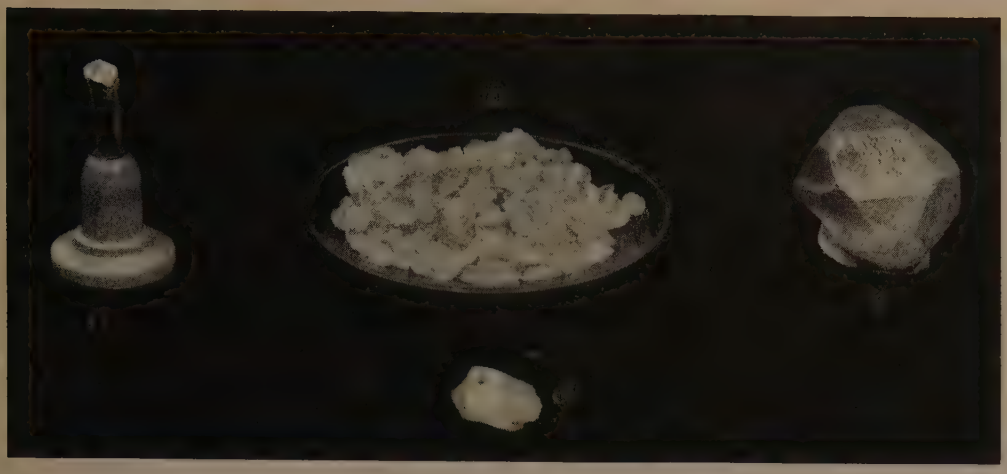
The Rockies! Heartless and cruel to those who would flaunt them. Warm and generous to those who know their ways, and respect them. Mightiest range of the North Continent, and custodian of incalculable wealth! Well might poets rhapsodise their every mood; or the land in which they lie look to them for wealth. It is not hard to understand the sentiment of the "hard rock man" who loves the Rockies, even when he damns them. Gold. Silver. Tungsten. Beryllium. RADIUM!—they have them all; and more.

Do you love gems?—and who does not! Look to the Southern Rockies and you see the whole court of gems. True, His Highness—the diamond—rules from under the Southern Cross. And his lovely consort—the emerald—has never been seen here. Yet, My Lord Sapphire sits at the foot of the Rockies, near Helena, Montana; the Princess Beryl lives on a mountain top in Colorado; the high-caste Topaz passes his austere life on the slopes of a brooding peak, and the Cousins Garnet—like messengers of the king—are to be found wherever the lordly train holds forth.

Lesser families—the sober Amethyst, the sincere Citrine, the expectant Turquoise—yet of proud lineage, lay scattered at their feet. Amazonites, Chalcedonys, Jaspers, Chrysoprase, and Peridot guard the royal households. Agates, like bad little boys, are found where least expected. Even the imperious Court Jester—the Tourmaline—deigns to visit the Rockies.

The beautiful blue aquamarine and the green beryl, cousins to the emerald, crown the lofty heights of Mount Antero in Chaffee County, Colorado. This proud block of altered vulcanism was host to some of the finest gems found on the North American Continent. From October to June, winter holds sway and covers himself with the ermine mantle of snow and ice before which the hardiest mountaineer falters. In July one may ascend the peak—if one has the legs and endurance of a mountain goat—and see the many test holes that have been sunk by ambitious gem prospectors. If your guiding star is in the ascendancy you may even pick up one or two of the exquisite, geometrically exact, hexagonal crystals. But do not be disheartened if you do not. You will find several "workings" on the upper slopes. Or at Buena Vista, a small town nearby, you can purchase fair specimens and a good dinner.

Beryl, including aquamarine, is one of the rock forming minerals, and is usually found, in crystals, in rocks left after the cooling of once molten magma. It may also be found in large masses, without definite external



PHENACITE GROUP

(a) Phenacite crystal growing on end of aquamarine; (b) small water-rolled phenacite crystals; (c) a large phenacite crystal and (d) a small one

structure. This last, is the chief source for the wonder metal, beryllium, which when properly alloyed has the strength of steel and is lighter than aluminium!

There is another stone found in Colorado that is a source for this metal. The Greeks had a name for it—"phenax," the deceiver. They forgot to tell us who, or what, it deceived. It is a stone very much resembling quartz, but harder and slightly heavier. Probably they alluded to this because they valued clear crystal highly. Times change; now phenacite—as we term it—is far more valuable, and good ore is worth twenty-five dollars a ton.

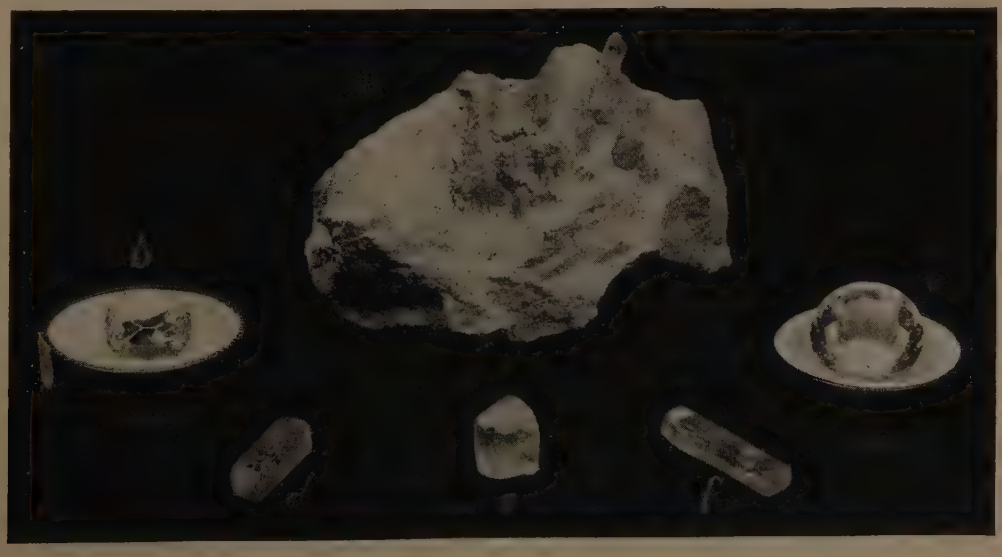
A few miles north east of Mount Antero we come upon a cluster of shacks that the map informs us is Nathrop. Opposite, we see a low ridge about two hundred feet high. This is a famous locality for fine precious topaz. Wonderful, small crystals have been taken out of the eruptive rock on this hummock. Some are pure and sparkling as the congealed drops of golden sherry; others are the pale blue of a frosty winter sky; again, they are colorless—*gouttes d'eau.* The mother rock is brown, earthy looking, and filled with spherical cavities. Inside, the fully formed topaz crystals grow, usually surrounded by minute clear quartz points. They put one in mind of the old Russian ikon—the topaz might be a favored patron surrounded by candles, and ensconced in his shrine. Even the short tapering terminal end of the gem resembles the saintly miter.

Pike's Peak, that watchful sentinel of the Front Range, has been the beacon to guide many footsore pilgrims to their journey's end. Grand, picturesque, inspiring, and famous; perhaps the best known peak in the world. Certainly the name conjures up romantic images. How many sagas of the West have been born in her lap! Her head is above the clouds, while the broad hem of her skirt covers hundreds of square miles of territory.

Proud Mistress of the Plains that she is, she has bedecked herself accordingly. Gold she has woven into the fabric of her gown, and set it off with topaz, smoky quartz and the patina of amazonite. Crystal Park—a fold in her train—has furnished gorgeous large topaz crystals for all the world to admire. They are unique in size and clarity. A fragment of a crystal that was found imbedded in amazonite, near Florissant, was estimated to have been a foot in diameter when whole! Rocky Mountain deposits—including the Thomas Mountains of Utah—have enriched thousands of museums and collectors with excellent specimens of topaz.

Amazonite is the beautiful verdigris green feldspar. Its fine castellated structure is as a scene from a fairy tale. It is much sought after as an ornamental stone for engraving or sculpturing small figures. It has the peculiar appearance of the jade from Yunnan, China.

Florissant, Colorado, is the gem hunter's paradise. Within short distances are found beryl, topaz, amazonite,

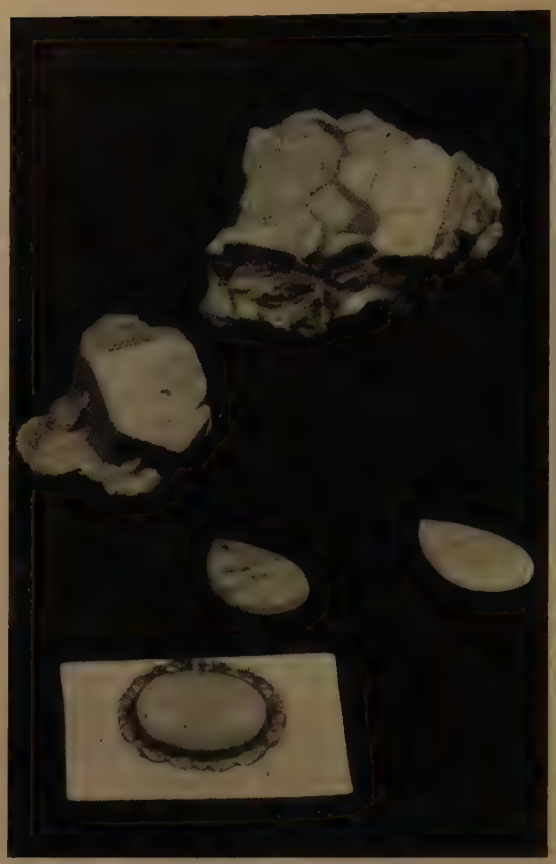


MEMBERS OF THE PRECIOUS TOPAZ GROUP

(a) Topaz crystals in rhyolite; (b, c) cut stones of white or colorless topaz; (d, f) honey-colored topaz crystals; (e) topaz crystal showing fine basal cleavage

smoky quartz, phenacite, zircon and petrified wood. Thirty-three miles further along is Hartsel. On the first rise, before coming to the town, you may leave your car and within a hundred yards, pick up a handful of small, opaque garnets. Or perhaps a long crystal of sable tourmaline.

Near Salida, Colorado, have been found some very fine blood red garnets. Here, also, have been mined garnet crystals as large as footballs! Malachite and beautiful chrysocolla—the green silicate of copper—have come from this locality. Pure white fire opals with mosslike and fernlike markings, small crystals of the fine bluish-green "Copper Emerald"—epidot, the rare green transparent fluorite, and the rarer translucent rose manganese — rhodochrosite, spectacular, purple amethysts, and many other fine gems also come from Colorado.



CUT STONES AND CRYSTALS OF AMAZONITE
Below we have a massive piece of turquoise and in the tray a number of cut stones of the same gem

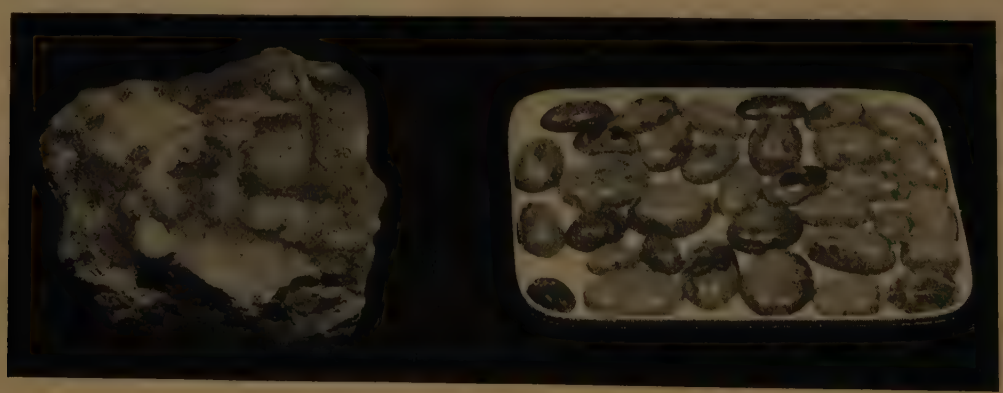
New Mexico is noted for the ancient turquoise mines of the Los Cerillos. These mines still produce the finest quality of American turquoise—an exquisite, waxy appearing, blue inter-threaded by a brownish trachyte, or matrix. Turquoise is also found in the Burro Mountains, in Grant County. Among the Indians of the Southwest, especially the Navajos, turquoise is the premier gemstone.

Rounded pebbles of garnet and peridot of good texture and color are found, usually in isolated pieces, in the New Mexico desert country. A remarkable thing occurred recently. A friend of mine from Taos, N. M., showed me a large chunk of *green* obsidian—volcanic glass—that weighed more than eight pounds! It was speckled with sperrylites, about three-eights of an inch in diameter, that looked like miniature round sea shells. A sheep herder had found it. He claimed to my friend that he saw it "falling from the sky, like a flash of light!" Believe it or not.—I don't! He probably picked it up somewhere and invented the tale. However, it was genuine obsidian, as was proven by the inclosed sperrylites of an undetermined zeolite.

Utah, once the bed of prehistoric Lake Bonneville, that immense inland sea, is the bedding ground of beautiful topaz—some of which enclose sand grains! Skirting the southern edge of the Great Salt Lake Desert lie the Thomas Mountains. This range is nearly as famous in Western lore as the mythical "Rock Candy Mountains" with their "Sody water wells." They are the source of the topaz crystals. They also occur in the rhyolite of Cave Creek, in Millard County. Nevada supplies us with lovely fire opal; turquoise in a grayish matrix; and the dark yellowish-green variscite.

Sixteen miles from Helena, Montana, between the Continental Divide and the Big Belt Mountains, the Missouri wends its tortuous way. Here is the site of the great gem-corundum "washings". World famous sapphires have come from this locality. The stones are for the most part comparatively small—rarely exceeding three or four carats in weight—but of an exquisite and characteristic shade of blue, and exceptional "fire" and clearness. Various other pastel shades are found. And even an occasional ruby of good color is unearthed. They are the hardest sapphires known. In the same territory some fine garnets and topaz have been found, along with the beautiful, but fragile, blue and gray cyanite.

At Three Forks, the confluence where the Gallatin, Jefferson, and Madison Rivers unite to form the Missouri, the highly prized black and white opalized wood was formerly found. Trees that (Continued on page 98)



AMANITA MUSCARIA SHOWN FROM VARIOUS POINTS OF VIEW AND AT VARYING AGES PHOTOGRAPH BY THE AUTHOR

Study the pictures on this page. Note the big, solid, bulbous base and the volva which is "free" only at its upper margin. Note the rather stocky stem on which is the flaring collar which almost disappears in the mature plant. The gills are white, rather broad and they curl when the mushroom is fully ripe

KNOW YOUR MUSHROOMS BY ELIZABETH E. MORSE

THERE is no sounder piece of advice to those who like to stray in gustatory by-paths than: "Know your mushrooms." Its soundness is brought home to us frequently by reading of fatal or nearly fatal poisonings of those relying on too little knowledge. These fatalities usually happen in about the same way as a case recently called to my attention. A couple living in Chester, California, found some beautiful mushrooms growing under their house. The lady of the house asserted that she knew the good from the bad, so these were picked, carefully washed and consigned to the stew pan, along with the much-misrepresented silver dollar. Instead of tarnishing, the dollar came out brighter than ever and the couple had a mushroom feast, the husband even drinking the water in which it had been cooked. In less than an hour they knew they had been wrong. Only quickly administered and appropriate treatment saved their lives.

The offending mushroom—which was really not at fault because it should have been left alone—was the fly mushroom, *Amanita muscaria.* This species alone has been the cause of fourteen deaths in the San Francisco Bay region in a single season. It is a mushroom of quite general distribution and of just as distinct characteristics as are the features by which one recognizes a friend or acquaintance.

The fly mushroom is identified by the enlarged base with the volva free at the upper margin; the solid stem, quite high up on which is the pendulent annulus; the white gills which are not attached to the stem; the soft white flecks usually found on the top of the cap. The color of the cap varies from dingy, pale ochre to yellow, orange or brilliant scarlet, so is not a guide to identification. But to one who knows his mushrooms the fly mushroom is unmistakable. Be safe and know yours.

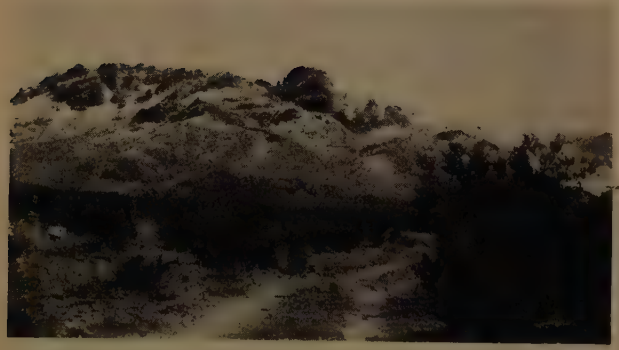
PHOTOGRAPH BY W. C. MATTHEWS

CREOSOTE BUSHES, COVILLEA GLUTINOSA

This desert growth is found to predominate on a red, sandy and gravelly outwash fan near the Tres Hermanos Mountains

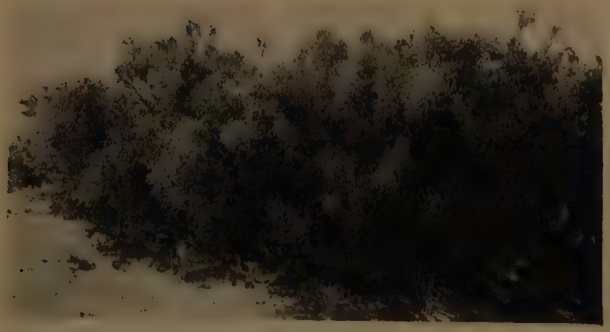
A YUCCA CALLED YUCCA RADIOSA

Some yuccas grow to a height of twenty or twenty-five feet and have several branches. Snow-colored Florida Mountains in the background



A SETTING OF DESERT AND MOUNTAIN

The deep dull green of the creosote bushes makes the desert beautiful when seen against such a background of mountains as this



JERUSALEM OR CRUCIFIXION THORN

It is a strange desert plant without leaves but with green bark and many long, hard, sharp green thorns which jackrabbits eat

HOW PLANTS TELL THE SOIL STORY

SOUTHWESTERN NEW MEXICO VEGETATION REVEALS LAND CONDITIONS

BY A. T. SWEET

All travelers over the high plateau of southwestern Mexico from the earliest pioneers to the present tourists have been forcibly impressed by the sharp lines of separation between different types of plant life. In some places the demarcation is as clear-cut as between fields of corn and fields of wheat. The early visitors marvelled at the unusual phenomena, but it remained for the botanist and the soil scientist to discover that it was caused by differences in soil, and that these queer formations of plants told in language any student could read the story of the land on which they grew.

This plateau region of New Mexico is a region of color. From Deming, near the center of the region, opalescent mountains rise abruptly from the plain. To the north is Cook's Peak, capped with snow many times during the winter. Southeastward lie the sharp, jagged, barren but wonderfully colored Florida (pronounced flo-*ree*-do) Mountains, and in the southern section, just north of the Mexican boundary, the Tres Hermanos or Three Brothers lift their symmetrical peaks into the blue. Southwest is Cedar Grove, and to the northwest the Grandmother Mountains.

It is a land of colors. In the early morning and late evening, the twilight hues of sky and clouds are even more splendid than those of the mountains.

The plants that cover the desert form the background. Beautiful in themselves, especially when seen during the winter season when the sunlight is least dazzling, they are all the more interesting when one can read the tale they have to tell of the soils on which they grow.

The soils of the region belong to three groups: the brown soils in the broad shallow valleys, the red soils on the lower mountain slopes, and the gray soils on the level plains. Each group is made up of sand, loamy mixtures, and clay in differing proportions.

The brown and red soils have an abundance of lime in the subsoil, and the gray soils possess this substance in both the surface soil and in the subsoil. They have, in fact, so much lime in the subsoil that it forms a thick, white layer called caliche.

Characteristic of the valley stretches where the soil is dark-brown and heavy there is, in winter time, a light-brown grass vegetation. Toboso grass, *Hilaria mutica*, predominates here. It is a low-growing bunch grass forming tufts eight to twelve inches in diameter, with uneven, curved and spreading stems that come from a single root. A good forage grass during the growing season, it becomes in winter time hard and woody.

Where the soil receives slightly more moisture or has on the surface more organic matter, the tall Sacaton grass,

Sporobolus wrightii, is the most prevalent growth.

From this heavy soil and its toboso grass cloak one may pass almost at a step to a low ridge of loose, sandy brown soil on which the main growth is a beautiful bluish-gray plant with feathery foliage, the blue sage, *Artemisia radii.* Estafiata, the Mexican herders call it, and value it highly for forage in the early spring. In this region it is a reliable indicator of the loose sandy soils of the brown group. The soap weed or yucca, *Yucca radiosa,* also grows abundantly on this soil. In places it is associated with the blue sage but is not as good a soil indicator because in places it also grows extensively on other soils. It is readily recognized by its tall flower stalks, bright-green head, and pantalet-like covering of dead leaves around the base. On the red, sandy soils covering the lower mountain slopes it grows in such profusion that in places the mountains, from a distance, seem to rise from a sea of green. Some plants send out branches and grow to a height of twenty or twenty-five feet.

High up on the slopes in the region where the soils are red, shallow, sandy, and gravelly, a dark-green, much branched, evergreen shrub, the creosote bush, *Covillea glutinosa,* ranks above the others. It is from three to five feet high and has resinous leaves with a disagreeable odor like that from creosote, from which it gets its name. It adds a touch of color to the desert but that seems to be its only use. Animals do not taste it and thus far man has found no employment for it.

On the sandier types of the gray soils, even where the caliche is near the surface, there are broad stretches on which the predominant growth is a greenish-gray, low-growing bushy plant, two to four feet high, with small narrow leaves and dense pinnacles of winged, one-seeded fruit, having the appearance, when dry, of clusters of Post Toasties. In this region it is known as chamisa, although its scientific name is *Atriplex canescens.* It is rather an important winter forage plant and both cattle and sheep eat it with apparent relish.

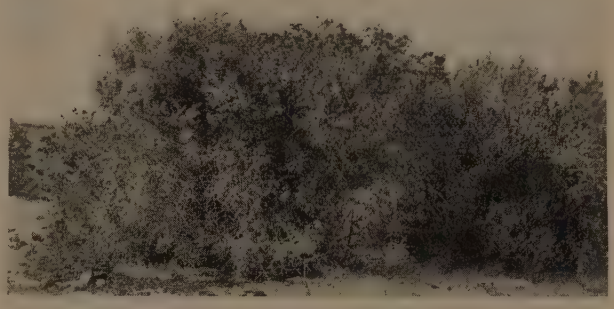
In places the gray soils are so filled with finely pulverized lime that at the surface they are loose and floury. On such areas, and in other places where the soil is extremely loose and gravelly, the predominating growth is the queer false buffalo grass, *Munroa squarrosa.* It seems to have no flowers but has a coating of fine, cobwebby hairs which give it, especially in the early mornings, a silvery sheen or frosty appearance. Like the land upon which it grows, it is of but little economic value.

On the red and brown sandy soils of loamy texture grows a green leafless shrub, the popotillo or Mormon tea, *Ephedra viridis.* It is between three and five feet high, yellowish-green in color with an abundance of slender stems and small brown scales at the nodes.

Each of these plants is writing a soil story of extreme interest, if one will but stop and try to read. The story is not writ in cryptic terms or undecipherable anagrams, but requires simply good powers of observation and the knowledge of the type of soil the plants prefer. The observing visitor to the Southwest will particularly note the plants and should know their why and wherefores.

A FIELD OF TOBOSO GRASS

This ground cover, known as Hilaria mutica, predominates on dark brown and heavy soils. At the right is the characteristic mesquite



AN IMPORTANT WINTER FORAGE PLANT

This is chamisa, a greenish-gray shrub with small narrow leaves and dense pinnacles of winged one-seeded fruit looking like breakfast food

A MOST DANGEROUS LOOKING PLANT

A clump of Spanish bayonet, one of the yuccas. It was found growing in close proximity to the two odd neighbors pictured below

VARIETY IN GROWTH ON THE DESERT

Side by side the popotillo and the barrel cactus grow. One has no leaves but green bark and many stems, the other has neither leaves nor stems

INSET PHOTOGRAPH BY R. S. WOODS

YOUNG CACTUS WRENS PERCHED ON A THORNY BRANCH

Their choice of nest site protects them from enemies and they build nests, such as that shown in the inset, in cholla cactus, thorny mesquite and catsclaw

BIRDS OF THE SOUTHWEST

BY FLORENCE MERRIAM BAILEY

PHOTOGRAPHS BY WILLIAM L. FINLEY

WHAT surprising pictures are added to one's mental gallery in crossing the Southwest for the first time! Even from the windows of an overland limited speeding across southern Arizona and southern California strange forms of giant cactus, "joshuas" and other tree yuccas, sotol, Spanish bayonets, creosote, mescal, and ochotillo astonish and fascinate. From the less rapid automobile many another unfamiliar form of tree and plant is added to one's acquaintance. But it remains for the leisurely camper to discover how well each set of plants and trees—plant associations as the botanists well call them—told off in their ascending order from the bottoms of the valleys to the tops of the mountains, gather about them certain birds and beasts to whose special needs they minister.

On the unforested desert a variety of tree-nesting woodpeckers and owls would be hard beset were it not for homes offered them by the giant cactus and the tree yuccas. The giant cactus, rising spectacularly high above everything else in its desert landscape, attracts so many gilded flickers and Gila woodpeckers that its columnar trunks are often riddled with their nest holes. How eagerly you watch for a sight of these unfamiliar birds! If fortunate, as you motor noisily by, both may burst out of their holes and fly away, the gilded flicker permitting a glimpse of the yellow underwings, that distinguish it

MOTHER ROADRUNNER BRINGS HOME A TID-BIT FOR LUNCH

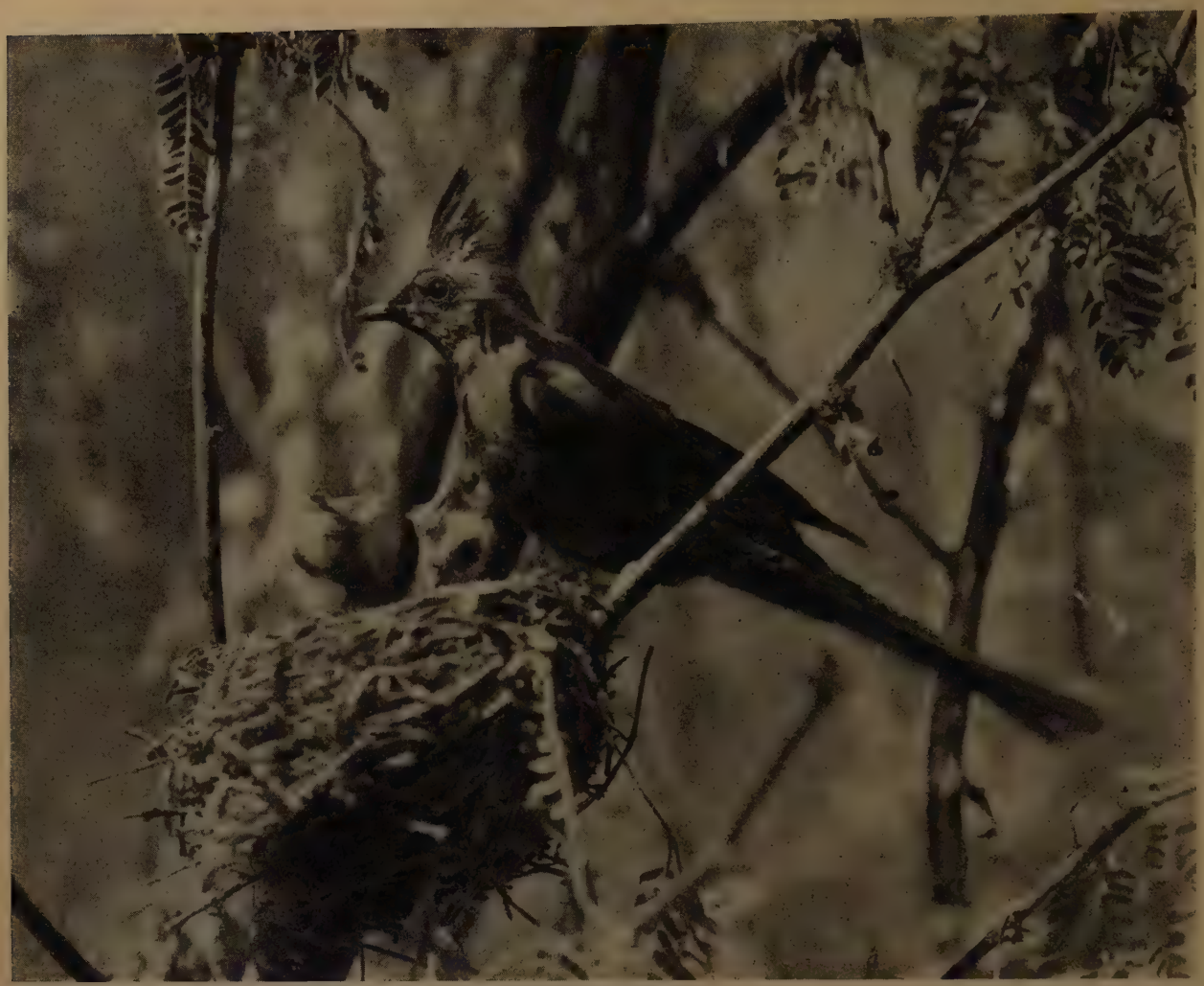
One of the world's most unique birds, it nests in thorny places but through proper advances and proffers of food can be made to be most tame and friendly

from the red-shafted western bird, if not of the red moustache that distinguishes it from the black moustached eastern flicker; while the Gila woodpecker displays white patches on its outspread wings, if not the drab and yellow of its under-body. Once, in June, I happened on several of their families in a giant cactus grove, the hoarse insistent young being fed in nests in the spine-ribbed columns about twenty feet above the ground; and I was interested to see one of the parents fly up to the top of its blooming giant and apparently drink nectar from a flower cup—more convenient at the moment than the ranch faucet where I later saw one quenching its thirst. Another year, in March, when the nights were still cold, I saw at sundown four of the gilded flickers come into a grove of giants apparently looking for sleeping quarters.

That morning we had luckily caught sight of a small screech owl—the sahuaro or giant-cactus screech owl—dozing in its doorway near the top of its cactus pillar; and after the woodpeckers had gone to bed saw it launch out with a quick low *hoo, hoo, hoo-hoo-hoo* through the dim light to begin its day. Although we did not discover any of the smaller, strictly nocturnal elf owls that live in the giant cactus, by the help of a sotol ladder we were able to bring down the pretty sahuaro for a snap shot between naps.

On the giant cactus and other terraces above the river bottoms, another strange form of desert vegetation, the silvery green, grotesquely jointed and bristling cholla cactus offers protectingly needle-clad nesting sites that are taken advantage of by colonies of cactus wrens and wood rats. Above the cholla cactus flats, throughout both the thorny mesquite, catsclaw and lote slopes leading up to the Santa Rita Mountains seen from Tucson, when driving by we found cactus wren nests "the most conspicuous ornithological features of the landscape," their large straw-colored, retort-shaped forms standing out strikingly though well protected by an armament of thorns from hawks, owls and other enemies. When camped near there, in an intensive study of these nests, we counted ninety-five. Thirty-one of these were among the innumerable ones built in the spiny cholla. Of sixty-four found in thorn-clad bushes or trees such as mesquite and catsclaw, thirty-five were additionally safeguarded by being hidden inside thick round clumps of the red-flowered mistletoe, whose berries offer desert food to the black phainopepla.

Passersby through the cactus wren country in November may see the large speckle-breasted builders busily repairing their nests—relining and thickening the walls and lengthening the tunnel-like entrances—to roost in during cold winter nights. In relining, the sleeping chamber is sometimes so well supplied with the feathers of small neighbors as to suggest a feather bed, and the walls of one nest contained material from eighteen kinds of plants. In January and February, within a small radius, I found thirty nests used as winter roosts, the birds re-



ONE OF THE INTERESTING SOUTHWESTERN BIRDS—THE PHAINOPEPLA

Crested avian dweller of the arid regions perching on its nest full of hungry youngsters. Berries of the red-flowered mistletoe are favorite diet items

tiring to them at sunset. On warm days in January, prophetic outbursts of song were heard from the cactus wren, a strange grating, monotonous song but not without suitability and charm in the desert.

Among the bird neighbors whose feathers are used for nest lining by the cactus wren are the scaled and Gambel's quails, whose sociable, talkative flocks are the delight of the camper fortunate enough to pitch his tent in their midst; the little gray, yellow-headed verdin, who like the wren seeks comfort on cold winter nights by roosting in its warm nest covered with thorny twigs and built in thorn bushes; and also the roadrunner, that droll, swift-footed catcher of lizards, snakes, tarantulas and scorpions, the most unique bird person of the Southwest. He accomplishes an ever-changing expression by raising and lowering his crest and long tail. By friendly approaches and proffers of appropriate food he may become a delightful camp mascot and a ready, most interesting subject for the photographer. Nesting sites are afforded the roadrunner by a variety of trees, among them thorn-clad mesquite, cactus and tree yuccas.

Tree yuccas on the Mohave Desert also house the shrike and the ash-throated flycatcher, and in other desert places sometimes the handsome lemon and black Scott oriole, though more often the large brownish thrashers of the Southwest, recognized on sight by short wings and long tails that give them a tilting flight and whose strident calls and loud musical songs add richness and color to the arid land. Tree yuccas also largely house the white-necked ravens, so called because the hidden bases of their black neck feathers are white. Characteristic birds of the desert, they build between the guarding bayonets of the tree yuccas in the grim Jornado del Muerto and lesser desert tracts. In the fall migration thousands of them move slowly southward and during the winter may gather in towns on their way, where they do good service as scavengers. They also gather in cultivated valley bottoms where they can get water and follow the plow for worms. Here flocks may be seen circling overhead, rising higher and higher for many hundreds of feet.

Besides the giant cactus and other thorny cactuses and spine-tipped tree yuccas that offer protection to nesting birds in the desert region, there are many food bearing plants, white-blossomed sotols, century plants and yuccas. Most interesting of all are the green ochotillos or candle bushes, so called from the flame-like flowers that tip their long candle-like green rods. These often grow in close ranks on a hillside, and like the century plant and yucca

A UNIQUE ARIZONA BIRD, BY NAME PYRRHULOXIA

With its high mobile crest, parrot-like bill and striking gray and rose plumage it is a most interesting bird. It is often seen on the university campus at Tucson

attract numerous hummingbirds and other winged visitors that stop in passing or gather to feast on the abundant nectar and the many insects that buzz about them. Numbered among their visitors I have seen the black-chinned, broad-tailed, and the rare broad-billed hummingbird with the livid red base to its bill; a sparrow hawk, house finch, green-backed goldfinch, western gnatcatcher, ash-throated flycatcher, the Scott and Arizona hooded orioles; and among migrating warblers the black-throated gray, Audubon, orange-crowned, pileolated, and best of all the beautiful painted redstart, presumably on its way up a near canyon to nest. The red that brightens its black and white plumage tones well with the torch of the candle bushes when it is perched near the flowers.

But of greater service to bird and beast than all these small groves of strange growths on the desert is the thorn-clad feathery mesquite covering great tracts with its miniature forests, affording protected nesting sites for all who come and in blossom time hosts of insects that gather about its fragrant yellow tassels. Numbered among the birds that take advantage of its largess are distinguished beauties—the rich-voiced Arizona cardinal; the unique Arizona pyrrhuloxia with his high mobile crest, parrot-like bill, and striking gray and rose plumage; the painted bunting or nonpareil, the familiar cage bird with his coat of many colors, found in the Carlsbad Cave region and the Rio Grande Valley; the vermilion flycatcher of the southwestern states that in an ecstatic nuptial flight raises his round scarlet cap, puffs out his scarlet breast and hovers twittering till he slowly floats down featherlike through the air.

THE GILA WOODPECKER

The white patches on its outspread wings and the drab and yellow of its under-body identify it

Other notable birds find congenial homes in this, the first climatic life zone above the Tropical—known as the Lower Sonoran Zone—to which belong the mesquite, ochotillo, allthorn, tree yucca, and giant cactus. Among them are the white-winged dove, the Audubon caracara—the Mexican emblem—Harris's and zone-tailed hawks, burrowing owl, cactus woodpecker, Texas nighthawk, Costa's and blue-throated hummingbirds, black phoebe, scorched horned lark, Rio Grande meadowlark, the

YOUTHFUL BURROWING OR GROUND OWLS ALL IN A ROW
Offspring of this interesting bird which has developed individual ideas about home sites and given up an arboreal abode for the desert itself

desert and Cassin sparrows, western blue grosbeak, and the western mockingbird—whose names rouse such delightful memories that it is hard indeed to pass them by without a word. They show the Southwest's avian wealth.

Not all the birds found in the Southwest depend on trees and bushes for nesting sites, many being attracted by the protection offered by cliffs and canyons. And as you make your way up from the lowest levels, among those to be met with in passing are the friendly Say's phoebe that also nests about houses and bridges and inside wells and caves, the trustful rock wren of sandstone ledges that marks its nest with a pathway of stones, together with the canyon wren, the rich-voiced bugler of deep canyons.

THE ELF OWL IN ITS CACTUS
Many of these home sites are to be seen by the bird observer

If your route takes you across the wide eroded mesa country of New Mexico, the spirited little prairie falcon may be seen hurling himself down from a rock shelf high overhead, where his mate and young wait for him to bring them food. Still higher on a ledge of rock perhaps you may sight the bulky nest of the widely ranging golden eagle. On reaching the natural fortresses of the Enchanted Mesa and Acoma, the white-patched forms of white-throated swifts that screech by with incredible speed may come to rest against the seamed faces of cliffs ready to harbor them. Many of the loftiest cliffs and deepest canyons of the west, including the Grand Canyon of the Colorado, are associated with these surpassing aeronauts.

Having motored up from the hot giant cactus and tree yucca country of the Lower Sonoran Zone into the next cooler live oak, nut pine and juniper belts of the Upper Sonoran Zone, though finding some of the same birds you also find many new ones characteristic of the cooler country. The widely spreading live oaks with their generous crops of acorns supply food for the acorn-storing woodpeckers of the Southwest—the California and Mearns—while their ample trunks and branches supply nesting sites for many other homemakers, among them the rare brown Arizona woodpecker, friendly Bewick's wrens and gentle gray, tufted titmice besides the rare, strikingly-marked bridled titmice of Arizona and New Mexico.

In the warm sunny valleys of southern California, the great live oaks are shady islands alive with birds. On their floor familiar towhees scratch among the leaves and in their branches perhaps some small vireo is busy hanging its cradle. The air resounds with the jolly *ja-cob, ja-cob* of California woodpeckers, the amicable squabbles of passing yellow-bellied kingbirds, the imperious squawk of the California jay, the happy (Continued on page 98)

HIDDEN VALLEY

BY FRANK C. HIBBEN

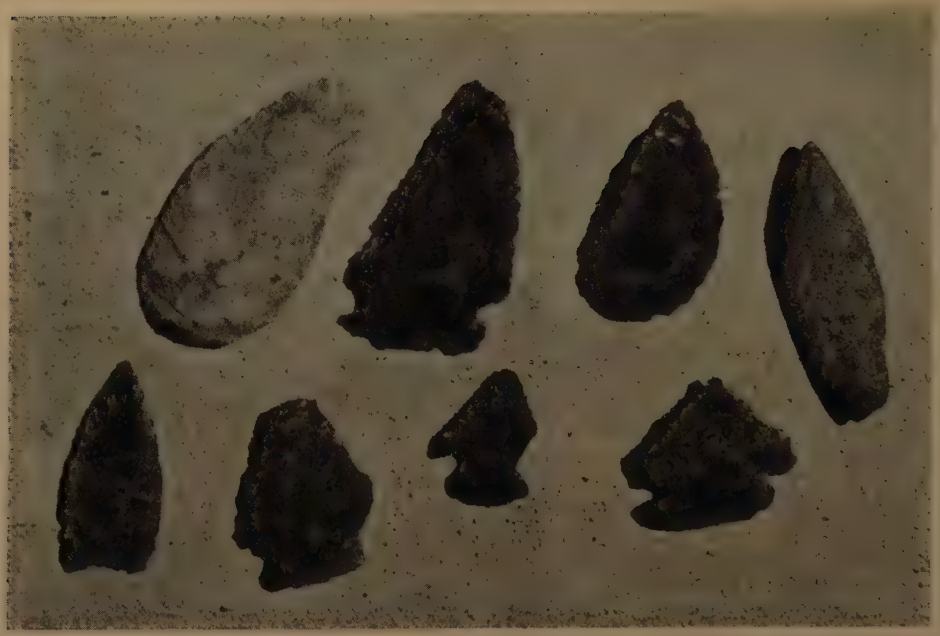
I FOUND a valley several years ago. I had always dreamed of finding such a place nestled away among some mountains whose very name was unknown or forgotten. I well remember that instant when I rounded the last lava boulder and looked down upon my little valley, strewn with shattered fragments of the red cliffs which lined the sides. It was all aglitter with chips and flakes of obsidian on the sandy floor. A little stream, its banks here and there plumed with willow and aspen, rippled its clear spring water over the volcanic boulders. A stream of any sort is worth more than gold in that country and this one was good water. Rainbow trout splashed in the riffles. The sun, slanting over the minaret pinnacles of the northern Inyos, made a silhouette of the ragged cliffs to the north. Further away the Excelsior Hills showed black against the Nevada sky. The puffy desert clouds dripped red in the sunset, turning the limestone to pink and the lava to orange. A golden-mantled ground squirrel slipped out of a little crevice and perched upon the rock a foot from my hand.

"Little fellah, tell us where piñon nuts grow best," said Deep Springs John as he pointed with a bronzed finger to the trees on the valley floor. But then you don't know Deep Springs John.

I met him some years ago in a haphazard way. One never meets Indians on purpose, anyway. I had been living on reduced grub for some time and after going on dried prunes and jack rabbits for several days, I was glad to drop down out of the Silver Peaks to fill up my food kiake at some of the valley ranches. My lead burro, Missouri, was getting thin on the sparse grass and burnt cholla and the last march of thirty miles or so would have to be done on no water. So we did those last miles in the starlight, Missouri and I, water or no water. The other exhausted burros had given up and Missouri dragged them along with taut lead straps like a locomotive and a train of cars. He pricked his drooping ears to my whistle and his little round hooves padded softly in the sand beside me. I knew the brave old beast would go with me until he dropped and at that never tighten the rope in my hand.

So that was the way Deep Springs John saw us as we came out of the desert at dawn into his little ranch. I called his homestead the Camp of the Horn of Plenty, and we stayed a week and grew fat on his melons and corn. He liked us—or, rather, only Missouri—and even spoke to us at rare intervals, which is unusual in a Piute and especially in Deep Springs John.

"Little horse better than wife," he muttered as he inspected Missouri's ear. "No wife can carry two hun-



OBSIDIAN ARROWHEADS FOUND IN THE CAVE

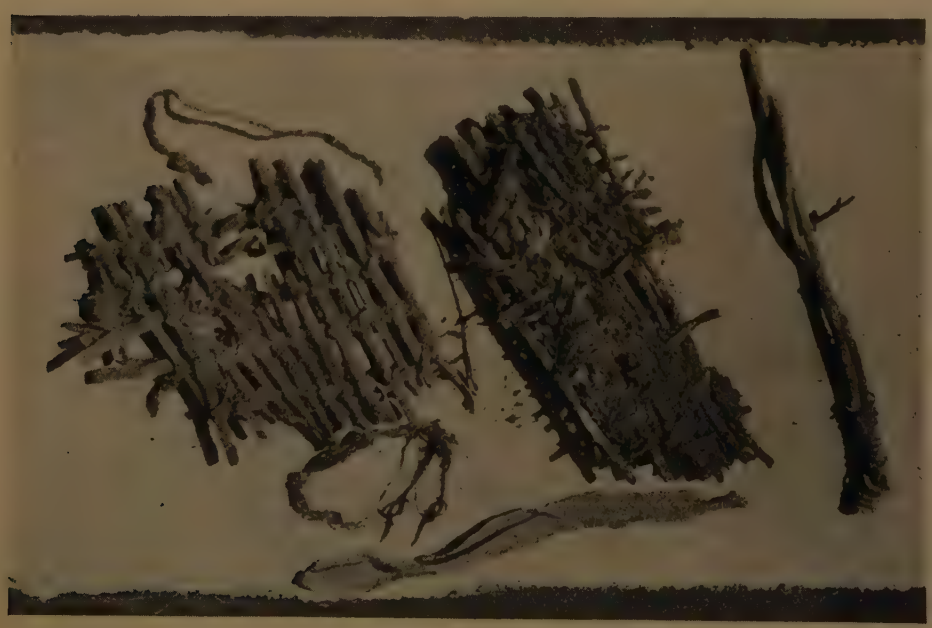
The left hand light-colored one is a stone skin-scraper and the right hand light one is a bone arrowhead of ancient days

dred pounds and be good friend. White man's wife no good. Can't cook."

And so it was that Deep Springs John led me to the valley which I suppose was rightly his, as he said his great-grandfather had taken him there as a child to help gather and roast the nuts of the one-leaf piñon. All day I had followed behind the stolid Indian. He sat uneasily on his white mare and his blue-ribboned hatband flapped idly round his face. Our trail was marked on no map but wound in and out among gigantic boulders and over jagged lava flows and on rock ledges. Even where the rock was solid, the track had bitten deep into the stone. I could imagine, as I led my burro train up the windings of this trail, that at every turn I might meet some of those who had gone that way before, bending under the loaded nut baskets. The rock showed the passing of centuries of moccasined feet, and now old John rode his white mare over the trail and his travois poles dragged behind. All day long he had spoken no word. Indeed one doesn't invite conversation in a country like that. The more you talk the less you can see, and there is more to see than can be accomplished between sunrise and sunset. Even the little blue-bellied lizards on the sunny rocks make no noise. They just sit and look. John told me they were very wise.

I looked down into my valley and then to the rock at my side. There, dug deep into the lava with an obsidian knife, the ancients had carved an outspread hand with the fingers pointing up. John had pointed it out to me and said, "Here. Food." I drank in the panorama of the valley and turned to ask Deep Springs John about the rock picture. John was gone. Not even the squeak of a travois pole on the rock. It seemed that John knew more about the valley than I, but it seemed, too, that he had given it to me.

For ten days I ranged the valley, while my burros fed on the bunch grass and rolled in the sand. I spent the days walking among the sage brush and gathering obsidian arrowheads and flake knives which glittered in the sand like rough-faceted rhinestones. I traced out with charcoal the many petroglyphs and rock pictures on the canyon walls and took numberless photographs of them. There were spiral and gridiron designs and water signs to rival the most ornate of Egyptian hieroglyphs, all chiselled deep into the flat lava surfaces. The sand of the valley had buried some of the pictures more than a foot deep along the canyon walls, and this I dug away and found more arrowheads as I did so. In the full of the afternoon and towards the time when the sage began to cast the long shadows of evening



RELICS OF A PAST RACE FOUND IN THE CAVE

Remnants of baskets, a bit of ceremonial robe interwoven with feathers, a piece of bow string and a bit of ancient leather

down the valley, I went back to the high entrance where I had first stood with Deep Springs John. The little chipmunk was still there with a piñon nut in each cheek pouch. Long before the sun sank over the rocks to the west, a coyote came out of a clump of fox-tail pines and set his nose to the wind. The chipmunk squeaked and flipped his tail. A pocket gopher withdrew his head, caving the dirt in after him. The coyote swung his head towards us, then withdrew into the pines to set the whole valley echoing with his whining and barking. For two hours he complained of my being in *his* valley, one set of barks flowing upon another until every wild thing along the creek was either beaten into silence or adding its voice to the clamor. As the shadow touched the edge of the cliff, the great dog coyote flattened the echoes of his own barks with one long-winded howl. Setting his head low, he swung out from the little clump of pines closely followed by two others of his own kind. They all scrambled up a steep wash, sending down little cascades of dust as they climbed. The three showed black against the sun for an instant, then disappeared.

Again the valley was mine. Behind the fox-tails where the coyotes lived was a black space that was not rock. As I circled around on the jagged valley wall searching for hand holds to climb to this tree clump, I marked a crevice embellished with foot holds and hand marks carved in the slanting sides. As I climbed the holds fitted every step and in a moment I stood on the ledge with the fox-tail pines. Behind and between the stunted trunks showed dark the opening of a cave, arching up inside from the opening on the other side of the trees. I had but time to pace off the floor of the cave and rout a furry-tailed pack rat out of his pile of piñon cones and obsidian chips in one corner before the twilight left the ledge and the cave in almost total darkness. The twilight is short in Hidden Valley.

It was dawn of the next day when I again went up the stone ladder in the crevice to the house of the ancient men of Hidden Valley. The floor of the cave was (Continued on page 98)

PETROGLYPHS UNCOVERED ON THE FACE OF THE ROCKS

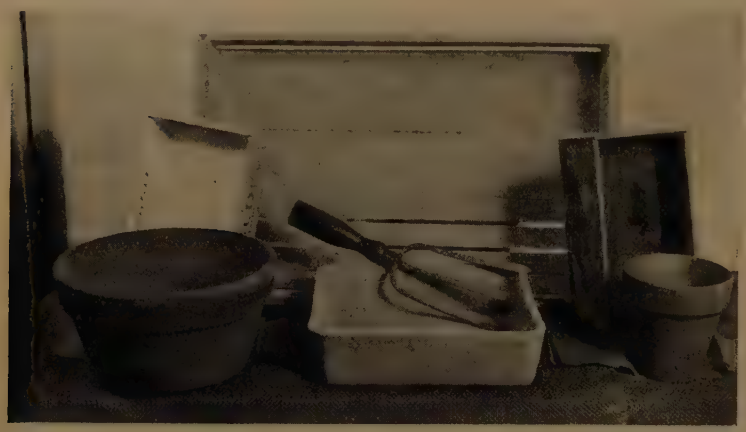
These great lava boulders were so hard that they would chip only from friction against their own kind, yet they were carved thus so long ago that even the Indians who left the bits of obsidian knew them only as done by an ancient people. Below, the author uses a "mano" on the surface of the communal "metate"

DEALING WITH SEEDS

SOME PRACTICAL ADVICE TO THE GARDENER

BY F. F. ROCKWELL
PHOTOGRAPHS BY THE AUTHOR

GROWING plants—is there anything more fascinating for anyone interested in gardening of any kind? Mastery of the methods of creating new plants—not necessarily new varieties, but just new plants—is like an Aladdin's lamp in the hands of the plant lover. Once he knows the whys, wherefores and hows of the various methods of propagation, he has a whole new world at his command. The flowers and shrubs of the four corners of the earth, so far as climatic conditions permit, are his.



THE WAYS AND MEANS OF HANDLING SEED SO THAT IT WILL SUCCEED

Above we see the mixing of the soil for starting the seed, using a half-and-half mixture of garden loam and peat moss. At the left are the various items one should have for starting seed. The earthenware bulb pan at the left is inexpensive and efficient. Below is a bed prepared for sowing seed outdoors. Such a simple but carefully prepared bed as this will greatly increase the chances of success. Making and preparing the bed is described in detail in this article

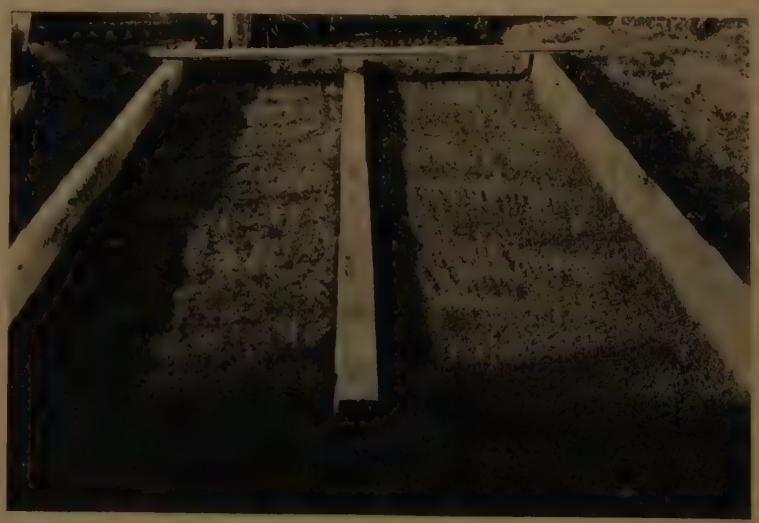
These methods are not difficult to learn. With them, as with anything else, practice tends toward perfection. But a lot of the "mystery" of the art of propagating plants no longer is a mystery; it is no longer carefully guarded by a few as a "trade secret," but has been brought out into the open, for anyone who cares to, to learn about and try. The Editor of Nature Magazine has asked me to tell you, in as explicit and non-technical a way as possible, about modern methods in making new plants. I feel sure that any gardening reader who attempts to put these into practice will find that he or she has added immeasurably to the enjoyment of growing plants.

There are, broadly, three distinct types of plant propagation. The first is the one most widely employed by Nature—reproduction by means of seeds.

The second way is the formation of new plants by direct growth from old ones: by the splitting up or "division" of the crowns or roots; by runners, as in a strawberry plant; by "suckers," as the raspberry; by "off-sets," as with the familiar "hen-and-chicks"; and in other similar ways. Like reproduction through the agency of seeds, it is a "natural" method.

Thirdly, there is still another type of reproduction, which for want of a definite name, we will call *artificial* vegetative reproduction—that is, the making of new plants by such artificial means as cuttings, grafts, layers, and so on.

Many plants can be increased by two, or by all three, of these different types of reproduction, but others cannot. Numerous hybrids, and very double flowers, for instance, do not produce seed. Many named varieties will



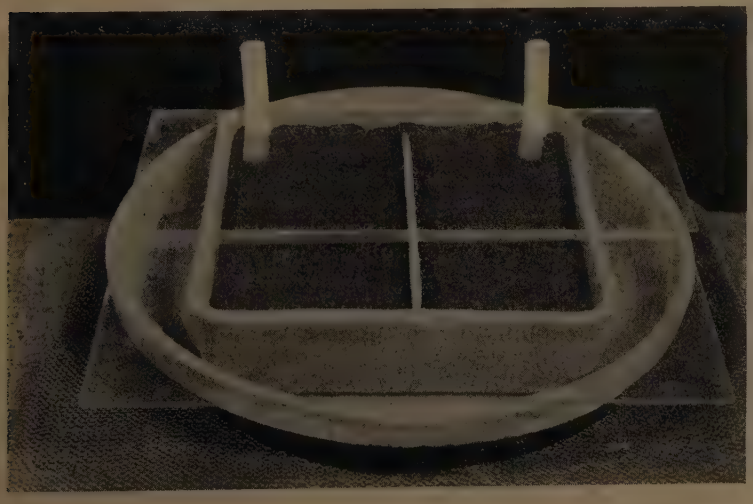
not "come true" from seed, even if they do produce it. So it is often either necessary or desirable to use one of the other methods in making new plants. Thus, evidently, it is a great advantage to the gardener to be familiar with all three. In this article seeds only will be considered. Following ones will describe the other methods.

HERE WE PROCEED WITH THE PREPARATION OF SEEDS FOR STARTING

Seeds may be quickly and easily disinfected, and the cost is next to nothing. This sterilization is a further protection against disease which may lurk in the seed. At the right we water with a syringe or hand sprayer, this method being employed to prevent washing away the surface and knocking down tiny seedlings. Below is a good method for fine seeds. Water is supplied evenly by keeping the saucer partly filled, and the glass over the seed pan keeps the surface always moist

To many persons a seed, in itself, seems a dry, stupid and inert thing. But actually it is a marvelous bit of mechanism. There is not space here to go into the fascinating story of how a seed is developed; the devious devices by which Nature assures pollination; how, for instance, the wild columbine is red in some parts of the world and blue in others, according to the color-appeal which will be most effective in attracting the birds or the insects which must be relied upon to do this job; how each seed-germ is fertilized by an individual pollen grain, so that from a single seed-pod a score or more of distinctly different plants may come; of how seeds are distributed, some with wings to float upon the breeze, some by rolling along the ground, some by hooks that catch in the fur of animals, some that are shot into space by steel-like springs, some which float upon the water, gradually becoming water-soaked, until they sink and are held in place in the mud by anchors until they sprout.

What does concern us here—because it has much to do with the practical side of growing plants from seed—is the mechanism of the individual seed itself. Here, wrapped up in a package which may vary in size anywhere from a football to the finest grain of pepper, is an arrangement so clever that it is a marvel of creative skill. This remarkable bundle of starches and sugars and fats is so put together that it will withstand all kinds of exposure and abuse. It may be frozen solid in ice, scorched in summer sun, even pass through the bodies of mammals or birds. Yet, despite these almost unbelievable powers of resistance, it is so sensitive that when it does find itself with the proper temperature and moisture, it will expand, burst, germinate and then nourish the seedling to which it has given birth until the latter can begin to gather its own sustenance from the surrounding soil.



We take it merely as a matter of course—all this mystery and miracle of seed germination and growth. Far from realizing what a wonder it is that under even the most ideal conditions these seemingly dead bits of mat-

ter, seed, can be brought to life and made to push their way out of their dark prison cells within the soil, we sow them with the utmost carelessness, and with little or no thought as to their special requirements. We bury them so deep—in proportion to their size—that they are covered with tons of soil; or permit a cement-like crust to form above them which makes their escape an absolute physical impossibility. And then we blame—not ourselves, but the seedsman who supplied them.

Recent scientific experiments with the germination of seeds have brought to light a number of interesting facts. It has been found, for instance, that many seeds have to undergo a period of low temperature, or even of freezing, before they will germinate satisfactorily. Many shrub and tree seeds have definite periods of ageing—corresponding to the gestation period in animals—before they will sprout. Others can be made to germinate only at definite temperatures. The range for annual delphinium seeds, for instance, is only about ten degrees, approximately between sixty and seventy Fahrenheit. Above or below that they germinate poorly or not at all. Hardy delphiniums, on the other hand, sprout vigorously at temperatures between sixty and eighty-five degrees.

KEEPING A CONSTANT MOISTURE
This is important in seed starting. The peat moss in the larger pot is kept saturated

The one outstanding discovery which is of practical use to every gardener is that the *constancy* of the moisture supply, and of temperature, is a most important factor in securing vigorous germination.

This brings us to the practical details essential in successfully growing new plants from seeds. We must have good seed, suitable soil, temperature control, moisture control, and protection.

Good seeds of course are the first essential. What makes seed "good"? First, vitality—the ability to grow. Second, heredity—"blood will tell" in the plant world as in the animal world. Third, purity—freedom from weeds and other undesirable seed. The seed sent out by most reliable seed houses can usually be counted upon as fairly good so far as vitality and purity are concerned. In many states there are now laws which protect the purchaser on these points. If the vitality is in doubt it is an easy matter to make a test by placing a pinch of the seeds on a piece of moist blotting paper in a saucer and keeping them at a fairly warm temperature, sixty to seventy-five degrees. Two or three days will usually be sufficient to show whether the seeds will "sprout" or not. Examination under a magnifying glass will give you a check-up on purity. Heredity is a more difficult matter. For that one must depend upon the reputation of the seedsman from whom the seed is bought. That is why it is so dangerous to purchase seeds from a source of which you know nothing. This has been proved over and over again by government and state tests. Notwithstanding this, millions of packets of seeds are sold annually which pass legal requirements but bring the grower only a harvest of disappointment and no results in the garden.

Now we come to the factor which, probably more than all others put together, is responsible for failure with seeds. It is the soil in which they are sown.

The ideal soil for seed growing should, first of all, be capable of retaining moisture for a long time, because the *constancy* of the moisture supply is all-important. Soils which dry out quickly and must consequently be repeatedly "soaked" to restore the moisture create a condition of alternate drying and wetting which is often fatal to success. The seed-soil should therefore be absorbent and sponge-like.

There is, however, a great difference between a moist soil and a wet soil. In the former they will sprout, but in a wet soil most seeds will rot. The seed-soil therefore should be porous, so that any surplus moisture, instead of being held between the particles of soil, will drain off rapidly. This ideal seed soil should be *friable*—should crumble readily. If the soil particles are too large it will be coarse and lumpy. If they are too small, so that they "run together" when wet, the surface will form a crust or bake. In either case a condition is created which makes it impossible for a small seed to force its way through. The seed-soil also should be sterile, or as nearly so as possible. We do not want either disease germs or weed seeds to injure or demolish our little seedlings. Further, the ideal seed-soil should be as nearly temperature-constant as possible—not quickly affected by fluctuations in the atmospheric temperature.

How is such an ideal seed-soil to be obtained? That is the practical problem confronting the grower.

Fortunately the introduction of finely granulated peat-moss as a universally available garden material has greatly simplified this problem. One of the remarkable characteristics of peat-moss is its tremendous sponge-like capacity for absorption. Pure sand, wet to the saturation point,

will hold less than one-quarter its own weight of water. Ordinary garden soil holds half its own weight, while peat-moss absorbs seven times its own weight. Because of its cellular construction peat-moss resists temperature changes. It is absolutely sterile. Peat-moss for seed growing purposes should be finely pulverized. There are on the market several grades prepared particularly for this purpose; some imported, some produced in this country.

A mixture of one-third each of peat-moss, clean garden loam, and builders' sand makes a good compost in which to start most seeds. For very fine seeds the soil can be cut down or omitted. If light sandy loam is used, the sand may be omitted. Many seeds germinate vigorously in peat-moss alone. Fresh peat-moss is slightly acid in reaction. For such plants as require an alkaline condition this may readily be neutralized by adding a quarter to a half a pound of ground limestone, or two to four quarts of unbleached wood ashes, to a bushel of the peat-moss.

READY FOR TRANSPLANTING

Below are seedlings removed from the seed pan. Vigorous root development has been encouraged by the peat moss in the soil

After the ingredients of the soil are thoroughly mixed together the compost should be sifted through a small mesh screen or soil sieve. If a considerable amount of soil is being used, then sufficient for at least the top inch should be sifted. Should the compost be quite dry—as it may be when the peat-moss is taken directly from a new bale or bag—moisten it thoroughly and turn once or twice before using. This is an important detail to remember.

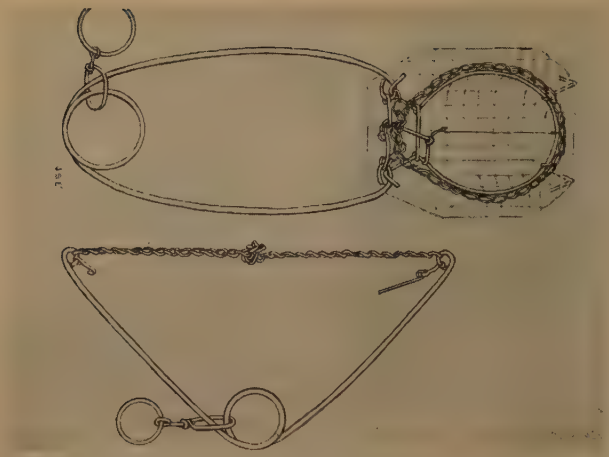
Just where it will be best to sow the seeds depends upon the kinds and the amount to be sown and the season of the year. Small quantities of seeds, and particularly very fine seeds, are best sown in earthenware seed-pans made for the purpose; or in bulb-pans, which are almost as good and much less expensive. Wooden "flats"—shallow boxes of any convenient size, with cracks or small holes in the bottom to permit drainage—two to three inches in depth, are frequently employed. If cigar boxes are used, they should be renailed, and varnished on the outside, to prevent warping and splitting.

When seeds are to be sown in the open, prepare a special bed for the purpose, forming the sides of boards or planks six to twelve inches wide, placed on edge and held by short stakes. If such a bed is built against a wall or a fence, a width of three feet will be convenient; if in the open, so the planter can work from both sides of it, it can be somewhat wider. Such a bed has several distinct advantages; it affords protection; makes it possible to raise the surface of the bed a few inches above the surrounding soil, thus providing perfect drainage; and facilitates the use of light frames covered with cheesecloth or plant-protecting cloth for the temporary shading which is sometimes desirable, especially while the seeds are germinating, and over young seedlings to protect them from scorching summer suns. At least two inches of the prepared, sifted compost should be placed upon the surface of the seed-bed.

Drainage is most important. It is well to place a little rough material—such as fine cinders or the screenings from the seed soil—in the bottom of each flat or seed-pan. If the outdoor seed-bed is made on heavy soil a two- or three-inch layer of cinders, four or five inches below the surface, will be beneficial.

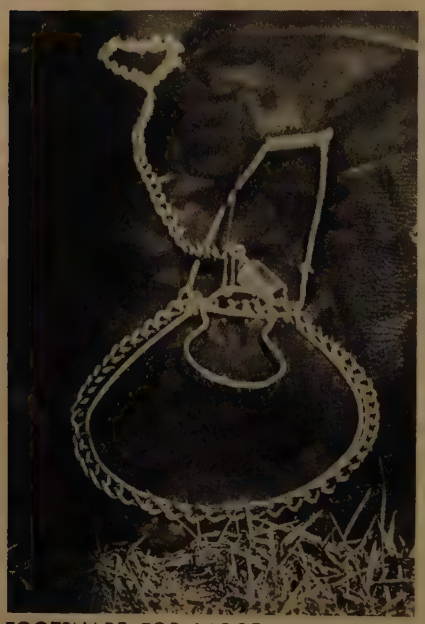
The prepared soil placed in flats or seed-pans should be pressed down firmly and evenly, leaving a space of about a half an inch between the soil surface and the top edge of the container. The outdoor soil bed should be raked fine and lightly pressed down. Everything will now be ready for the sowing of the seed.

A number of plant and vegetable diseases are carried in the soil or on the seeds themselves. It costs but a fraction of a cent per package to (Continued on page 97)



THE FOOTHOLD OR COYOTE TRAP

A compressed spring throws a smooth chain up around the ankle and holds it with slight tension so that there is no injury or pain to the animal



FOOTSNARE FOR LARGE MAMMALS

Another chain trap holding by means of a spring

A LOG-PEN BEAR TRAP

Through this means in localities where bear are protected but now and then do mischief they may be thus humanely caught and moved

HUMANE TRAPS

DEVICES FOR CATCHING ANIMALS ALIVE AND UNHURT AND SIMPLE CAGES IN WHICH TO STUDY THEM

BY VERNON BAILEY

FIFTY years ago, when a boy in the backwoods of Minnesota, eager to know the wild life around me, but without books and with few companions who knew more about the animals than I did, my only source of information was the animals themselves.

How to catch them for specimens and for study was a problem that occupied many of my waking hours, and which resulted in the invention of traps that would catch most of the small animals alive so that they could be kept alive for study, or released unhurt if not needed.

The larger animals were better known, as they could be observed by daylight, or, if needed for specimens, shot or caught in deadfalls or snares. The moles and the bats would not enter any traps I could devise, but the moles were occasionally captured alive in my hands as they ran their tunnels close to the surface of the ground, and bats could be found under loose bark on the trees, or sometimes hanging among the leaves, or in cracks of buildings, or bridges. Those needed for specimens could be shot on the wing as they flitted among the tree tops at dusk or circled about the house and barn in search of insects. So in one way or another I was able to learn something about all of the mammals in my part of the country, large and small, including many kinds that are rarely seen and little known, and some species that were entirely unknown.

The difficulties of the task and the occasional discoveries of new species of animals, or of unknown habits or strange traits of animal nature, always gave to the study a thrill that stimulated the imagination or led on and on into broader fields of biological investigations that have absorbed most of my time since those youthful days. Even now there is a thrill in going the rounds of a trap line with the possibility of finding strange rare animals in any well-prepared set, and still there are needed many new inventions for taking animals alive and uninjured for study specimens, as well as a great field for invention of better traps for taking fur animals, for the control of predatory species and as an aid to game management.

In 1887 the little box traps with various kinds of drop doors, made at home of tin and wire, were the best I had for small mammals. While successful with many species they were too bulky for rapid work on field trips, and their place was soon taken by the neat little "cyclone" trap, a hundred of which would go in a small trap bag, and whose strong double grip would almost instantly kill any mouse-sized animal caught. These and many later forms of small snap traps have contributed greatly toward

In the January issue of Nature Magazine we published an article on the steel trap and its cruelties, promising a constructive article on humane traps in February. Here it is. This discussion of traps is by Vernon Bailey, who has experimented with these devices ever since he was a boy, and Mr. Bailey will admit that that was a long time ago. Animals CAN be captured both for study and for their fur in a humane and civilized manner. They should be so caught.

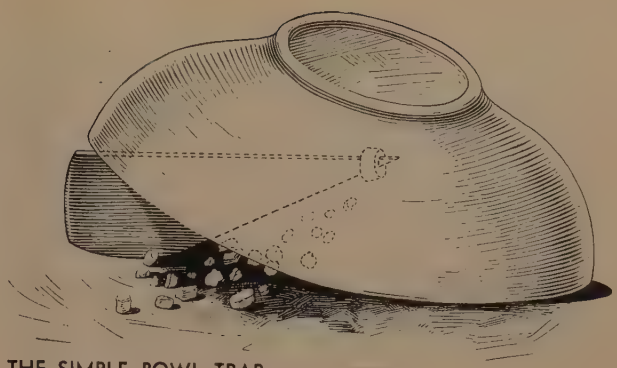
a fuller knowledge of the animal life of the country, and to the rich collections of specimens in our museums. In fact, in our collecting of specimens of the small mammals of North America, we have now gone farther than in our study of life histories and are turning back to the "catch-'em-alive" traps to get a better understanding of our animal neighbors.

Several types of live traps are easily made and easily used by anyone desiring to become better acquainted with animals, either large or small. Only skill and perseverance are necessary to capture alive any wild mammal, with the possible exception of bats and the larger whales. Even bats can be caught in nets, but are generally more easily taken when asleep on the roofs or walls of caves. Some of the small whales, such as porpoises, dolphins, and grampuses are also often caught in nets.

Bears are readily caught in log-pen or cage traps, while buffalo, elk, and deer are regularly taken in corrals or cage traps. Wolves and foxes and the large cats are not so easily captured alive, but can be if there is a real necessity for it. Beavers and muskrats are now being taken alive for breeding purposes, and eventually will be caught alive for fur, so that the young, unprime, and breeding animals may be released and not wasted. Squirrels and most of the smaller mammals are easily caught in simple live traps which anyone can make.

The medium sized and larger carnivores, such as wolves, coyotes, bears, bobcats, and mountain lions, have heretofore been captured mainly with steel traps, often in the most cruel manner with little regard to the prolonged suffering that results. So far there has been no satisfactory substitute for the steel trap for such animals, although many trappers would welcome one that would do its work in a humane manner. For several years it has been one of my fondest dreams to devise such a substitute and one with sufficient advantages to insure its widespread adoption and use. This is now so nearly accomplished that I feel sure of final success, although many imperfections are still to be overcome before the simplicity that has been developed in the common steel trap by hundreds of years of use can be attained. My trap is now being tested by skilful trappers in the West, where it will be in the greatest demand to control the local abundance of coyotes, wolves, and bobcats, which in places are still common enough to cause serious losses to livestock and game animals.

The special advantage of this trap is that it throws a smooth, flexible polished chain around the ankle of the



THE SIMPLE BOWL TRAP

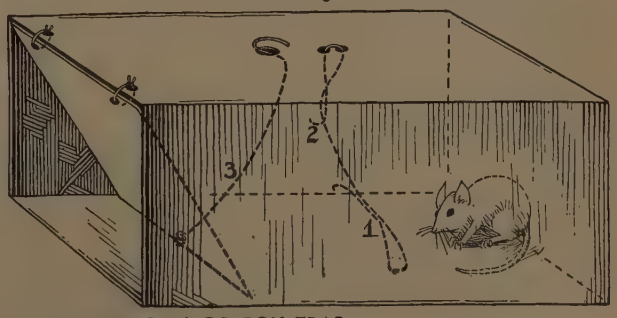
With a thin wooden trigger under one edge of the bowl, with bait on the trigger, mice and small animals may be easily caught

AN ARRAY OF TIN-CAN TRAPS

These were used successfully for catching kangaroo rats, chipmunks, ground squirrels, pocket mice and wood rats

POLE TRAP FOR HAWKS AND OWLS

The depressed spring throws a soft chain about the leg of the bird and a long cord allows comfort



SQUARE TIN-CAN OR BOX TRAP

Note bent wire for holding down the door when sprung, and wire trigger for holding up the door when the trap is set

A TRAP OF WIRE MESH

It has a tin door, and a bent wire holds the door shut. It is simple but effective

THE MILK BOTTLE DOES DUTY

Set and baited with rolled oats, it holds out a lure for mice and shrews to enter

A MUSKRAT TRAP SET

This is one of the many simple traps for taking this valuable little animal alive

CAPTURED BUT UNINJURED

Brother muskrat has been taken but he has not had to suffer his life away in steel jaws

captive and holds it with a slight pressure of the spring so there can be no pain or shock in the capture and no injury to the foot. If the animal is found within a reasonable length of time it can be released unharmed, and the crippling or loss of domestic or other valuable animals avoided. The trap can be used on farms and near buildings where steel traps could not be permitted, but its greatest value will be in controlling the abundance of our native wild life without undue suffering or waste of either desirable or undesirable kinds.

The trap is about one-third the weight of a steel trap required for the same animal, and less expensive. Its efficiency is on trial and will determine the extent to which it can be made useful.

A somewhat similar trap is being perfected for larger carnivores, such as bears and mountain lions, and even tigers and elephants if desired. It throws a single chain loop with a running noose through an iron socket up around the ankle. A catch spring keeps the noose from opening but does not hold it tight enough to stop the circulation or injure the foot or leg. The whole trap, chain and spring and all, for an animal the size of a bear will weigh only three or four pounds, against a twenty or forty pound steel trap, and it will cost only a few dollars. This trap may not be perfected and tested for possibly two or three years, but it works and is bound to be a success. Just how to release a bear that is not wanted will also require some experiments and practice, but I believe it can be done safely.

At present bears in Pennsylvania are regularly taken in log-pen traps, crowded out into cages, skidded up on trucks and taken where they are wanted, and released. Consequently bears are well distributed in the best forests of the State, and rank so high as game animals that any damage they may do to crops is cheerfully paid for by the Game Commission.

In Yosemite Valley, California, bear traps are made of large short lengths of drain pipe, mounted on wheels, with one end closed, and a drop door at the other end. When a bear gets troublesome or unruly the trap is wheeled to the right place, set and baited, and next morning the bear is taken away to some other place or sent to a zoo.

All of our game animals are manageable if their habits and dispositions are well understood, and time, skill, and intelligence are brought to bear upon the problem. Deer or any of our large game animals can be taken in cage or corral traps without injury and are often shipped for long distances for restocking depleted ranges.

Pole traps for taking hawks and owls have been, and in some States still are, in common use. These are steel traps set on top of poles or posts and baited for such birds. The trap chain is fastened near the top of the post or pole and the bird left hanging by its crushed and broken legs until it is killed or dies of the pain and injury. Pole traps are barred by law in some States, but are still in common use in others.

To prevent this cruelty and still afford protection to game farms, poultry yards, and experimental studies of game birds, I have made a simple spring trap that throws

a fine flexible wire chain up around both legs of a hawk or owl and holds it with a slight tension on the spring. A long string allows the bird to sit comfortably on the ground or on top of the pole as it chooses, and if it is one of the useful hawks or owls it can be released unharmed next morning. The trap may prove useful also to bird banders for capturing some of the large birds not readily taken in ordinary bird traps.

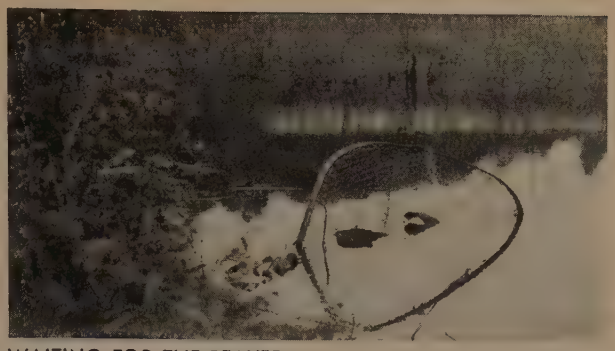
Probably the oldest and simplest of all live traps is made from a bowl, basin, tin pan, can, or box, placed bottom-side up on a stone, or board, or tin, with a thin oval trigger under one edge. The trigger should be wide enough at one end to raise the edge of the trap just high enough to admit the animal, and the slender, sharp end of the trigger with bait attached to the tip should reach near the middle of the bowl or box. The trigger must be thin so as not to hold up the edge of the trap after it is sprung, and thus let the animal escape. This is an excellent trap for mice, wood rats, ground squirrels, skunks, minks, and weasels, but it must be baited to suit the taste of each, with some of the bait scattered in a thin line leading into the trap.

For mice and small rodents use rolled oats to lead up to the trigger, and fasten a piece of bread, nut meat, or fruit, or all three, to the trigger. To remove an animal from the bowl trap slip a sack over and under the trap, and drop the captured animal into it, or slip a flat tin or stiff cardboard under the trap and lift it up and transfer the animal into a sack or box or cage.

For skunks, weasels, or such carnivores, use meat for bait, and scatter bits of meat, fur, or feathers at the side of the trap to lead up to the bait. If the box or dish is not heavy enough to hold a weasel, or skunk, or rat, lay a flat stone or piece of iron on top before tilting it up for insertion of the trigger.

For another trap take any old tin can, but preferably a square can that will not roll over. A good dump pile will supply cans for every size and species of small mammals in any locality, besides bottles and glass jars for other types of traps. Cut out one end of the can, and cut a piece of tin to fit and swing as a door inside of the opening. Punch two holes in the top corners of the swing door, and two to correspond in the top of can opening, and one hole in the bottom of the door. Bend wire rings through the two holes in door and can for hinges, and fit the door so it swings freely back into the can and strikes the edges or a cross wire when it swings down and closes the open end of the can. Punch a small hole through the top of the can near the middle and slip a stiff wire through it and hook the end into the hole in the bottom of door. Adjust this wire so it works smoothly through the hole when the door is drawn up into the roof of the can; then when the door drops down make a double crook in the wire where it will catch under the top of the can and prevent the door from opening again. This will keep the animal from opening the door and walking out. A spring wire attached to the top of the trap and front of the door will do just as well.

Make two other holes close (Continued on page 100)



WAITING FOR THE BEAVER

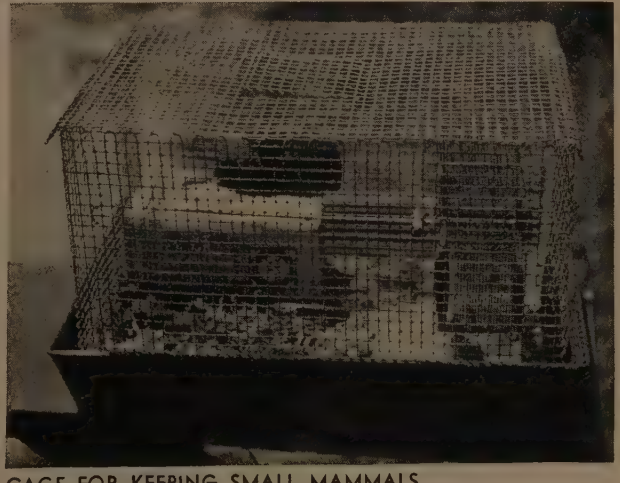
An effective humane trap for this busy builder of the waters set and waiting in the lake

THE BEAVER IS CAPTURED

But he is uninjured. All that has been hurt are his feelings. He may be studied now alive

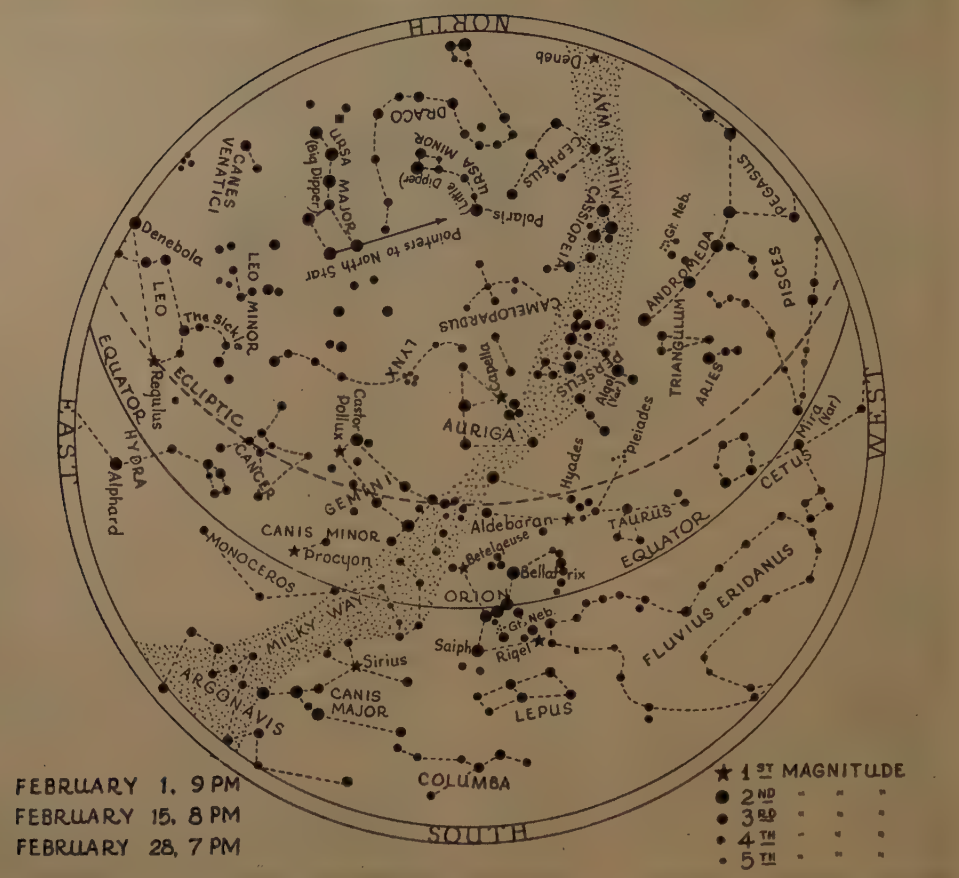
CLOSE-UP OF BEAVER TRAP

This device has been used with complete success wherever it has been used intelligently



CAGE FOR KEEPING SMALL MAMMALS

The meadow mouse has a nest box in the corner and a vertical wheel for play and exercise



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

IF THE SUN GOT HOTTER

BY ISABEL M. LEWIS

NO EVENT seems to us more certain than that the sun will rise on schedule tomorrow as it has for many millions of years and probably will for many million years to come. Whatever may happen to the inhabitants of this planet, the earth itself may reasonably be expected to continue to revolve around the sun until something in the nature of a catastrophe affects the sun itself.

How the solar system came into existence is a fascinating subject for speculation. It is equalled in interest only by the question of how it may end. There seems little doubt that the fate of the earth, as well as that of all the other members of the sun's family, is intimately connected with that of the sun. It is plain that the earth, along with the other planets, was in some way evolved from the sun and may eventually be destroyed as a result of some great catastrophe that the sun will experience. The possibility of the occurrence of some such destructive solar catastrophe is not beyond reason. Celestial catastrophes are occurring continually. Every outburst of a Nova represents a celestial catastrophe upon an inconceivably great scale. Within the brief span of a human life, which is but an infinitesimal period in the life of a universe, many outbursts of Novas occur. In fact, so frequently do Novas occur that it has been calculated that every star in our galactic system has probably passed through the experience of becoming a Nova at least once.

Just what does the outburst of a Nova signify and what causes such an outburst? When a star that has normally been faint and inconspicuous suddenly flashes forth with a splendor that rivals that of the brightest stars in the heavens it becomes a Nova. Again, when a star that may have been so faint as to be visible only in the more powerful telescopes experiences an increase in brightness that makes it easily visible in telescopes of much less power it also becomes a Nova through its sudden tremendous increase of brightness, though it may still remain at its brightest only a telescopic star. In both cases the star undergoes a sudden abnormal increase in light and heat. There have been instances of an increase of *ten thousand-fold* in the light and heat of a star within an interval of two or three days followed by a rapid

decline to invisibility within a few weeks. If such a star —or sun, we may say, since stars are suns—was the central luminary in a solar system such as ours such an abnormal increase of light and heat would cause the complete destruction within the brief period of a few hours, or even minutes, of all life that might exist upon its planets. Such an outburst might represent at one and the same time the death of old worlds and the birth of new worlds. Although life on the planet might be destroyed and the planet itself reduced to a molten or gaseous mass the process of evolution might begin anew founded upon the ruins of former worlds.

Observations of the behavior of Novas indicate that the disturbances that cause such outbursts may be only skin deep in their effect upon the sun, only the outer gaseous envelopes of the sun or the surface being affected. Although Novas have been observed to be surrounded by a nebulous envelope after the outburst, the star itself may continue to shine after the rapid decline in its abnormal brilliancy at approximately the same brightness as before the catastrophe. This shows that the star was not destroyed or even seriously affected by the event, although its planets, if such it possessed, were destroyed.

If our sun were suddenly to experience an increase of ten-thousand-fold in light and heat, as has happened in the case of many Novas, its family of satellites would become molten or gaseous masses intermingled with nebulous or gaseous matter expelled from the surface of the sun itself. The sun itself, surviving the catastrophe, with a comparatively slight loss of light and heat from its inconceivably great store of solar energy, would become the ruler of a new solar system built upon the ruins of the old augmented by gaseous matter expelled at the time of the outburst from its own surface or atmosphere.

The cause of the outbursts of Novas is still largely a matter of speculation. They may result from the encounter of the sun in its journeying through space with dark nebulae, swarms of meteoric masses, or cosmic dust, or close approaches to passing stars. On the other hand, these outbursts may be due to some internal disturbance that would produce abnormal conditions in the stellar atmosphere resulting in a sudden outburst of light and heat. What might produce such an internal disturbance is not so clear, but it is known that our own sun is a variable star, though with a small range of variability, and that it is subject to a cycle of solar eruptions or storms, known as sunspots, of little understood cause or origin. These might, in exaggerated form, develop into an abnormal outburst of solar energy. More must be learned regarding the internal constitution of the stars before it can be known certainly whether the celestial catastrophes that result in the sudden appearance of Novas are caused by the action of external or internal forces. Novas are generally classed as a special kind of variable star in which one tremendous outburst replaces the irregular fluctuations of light and heat through a great range that is observable in many stars known as irregular or peculiar variables. Whether normal, well-behaved stars, such as our own sun, acquire at some time in their existence the peculiarities of such stars or suffer their outbursts as a result of encounters with meteors, cosmic dust, or other stars, is an open question. But, sooner or later, if stellar statistics mean anything, such outbursts are to be expected bringing with them annihilation of worlds if the star affected is in possession of a planetary system such as our own.

On February 13-14 there will be a total eclipse of the sun, the double date arising from the fact that the eclipse begins in Greenwich Civil Time on February 13 and ends on February 14, crossing the international date line. The path of totality begins at sunrise to the northeast of Borneo, passes over Borneo Celebes, a few small islands eastward, and Losap and Oroluk Islands in the Caroline group. From there on it touches no land in its course across the North Pacific although it passes within twenty miles of Wake Island. It passes off the earth at sunset in latitude about 52½ degrees north, and longitude nearly 137 degrees west. At the most the duration of totality of this eclipse will be about 2 minutes, 53 seconds, but on the small coral island of Losap, the duration will be about 2 minutes, 5 seconds. This is the most favorable point for observation of the eclipse. The island belongs to Japan and the Japanese government has offered free transportation from Yokohama to Losap and return to scientific observers who are desirous of observing the eclipse. Partial phases of this eclipse will be visible all over the North Pacific, the eastern coast of Asia, Japan, the Philippines, the Hawaiian Islands, the East Indies, most of Australia, and Alaska and the western coast of North America as far south as southern California. The sun will set partially eclipsed from California to Alaska, although in the Aleutian Islands and northward on the coast of Alaska the eclipse will be over before sunset. The magnitude of the greatest eclipse at Nome, Alaska, will be 52 per cent.

Among the planets this month Mercury will be at its greatest eastern elongation on February 18, and may be seen for a week or so before and after that date low in the west in the evening twilight. Venus comes into conjunction with the sun on February 5 and after that date will be in the eastern morning sky and should be visible low in the east before sunrise the latter part of the month. Mars is still in the western evening sky in Aquarius but is too near the sun to be seen to advantage. Jupiter is in Virgo a few degrees to the northeast of Spica and now rises before midnight. Saturn comes into conjunction with the sun on February 8 and will next be seen shortly before sunrise low in the southeastern sky.

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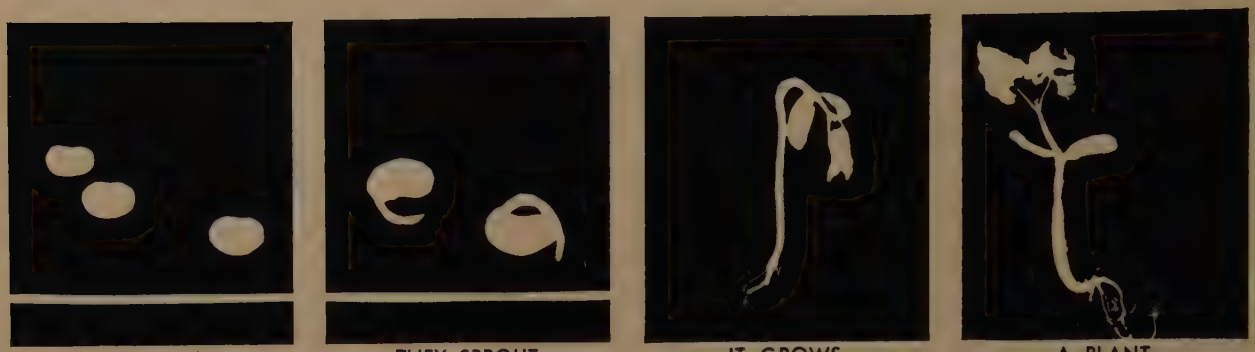


THE SEEDS | THEY SPROUT | IT GROWS | A PLANT

THE LIFE STORY OF A PLANT

HOW NATURE PREPARES THE SEED FOR ITS LIFE WORK

BY FLORA C. STEVENS

In the heart of a seed buried deep, so deep,
A dear little plant lay fast asleep.
"Wake," said the sunshine, "and creep to the light;"
"Wake," said the voice of the raindrops bright.
The little plant heard and it woke to see
What the wonderful outside world might be.

•

LET'S take some nice spotted beans and put them in a jar filled with water. We will let them soak over night.

*** NIGHT IS PASSING ***

Well, now look how they have swelled, almost ready to burst their skins. Let us take the oilskin coat off this fat little fellow and find out what is inside. Here are two nice thick slices of white bread for him to eat, and here at one end is the Baby Plant himself. Look how perfect he is with root, stem and tiny leaves already formed. Who could ever believe that he would grow into a tall bean-vine, taller than you or I?

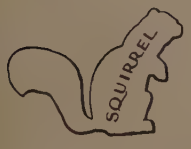
Nature cannot feed her baby as your mother does hers, so she packs a lunch-box for Baby Plant to take with him on his long journey to the light. She is just as careful as your mother and wraps the lunch in oiled paper to keep it fresh and dainty. Now, the first thing the Baby Plant does is to push his feet down into the ground. Those are the roots. Then he gives a mighty heave with his curved back and bursts the ground. That is the stem. Then he raises his little arms into the air and sunlight. Those are the leaves. Meanwhile he has been eating steadily to give him strength for these hard tasks, and although he has grown strong and tall he still needs the lunch his mother packed with such care. So he takes a piece of bread in each hand and carries it up with him. Soon after this he begins to take his food from the air and from the soil and his lunch box is empty. The oiled paper shrivels up and blows away and there is nothing unsightly left on the ground. The Baby Plant is a good citizen you see, and leaves everything neat and clean after his lunch.

After some time has passed the Baby Plant has grown as big and strong as the other members of his family and is ready to do his work in the world. He is busy making flowers, then fruit, then seeds which drop into the earth and start a new family. You see the Baby has now become the Parent.

A NATURE JIG-SAW PUZZLE STORY

BY MARY M. CUTTER

CALVIN had a birthday—five years old—and Uncle John sent a jig-saw puzzle to him. It was a lovely puzzle. All the children had been so deeply interested in Great-aunt Mary's Nature stories that this puzzle fitted into the scheme just wonderfully. Nearly all of the hundreds of little pieces represented an animal or bird or fish or tree or something in Nature. They were such funny shapes. There were hens, bears, fat-legged puppies, squirrels, birds, stars, fishes, apples, pears, and many more interesting things. And there was a gingerbread man.



The children had been having lots of fun trying to put the puzzle together on the table in the playroom. But some of the pieces just would not fit in. Then the older children had to go to school, so little Calvin tried very hard to get the fattest of the puppies into a place made for the gingerbread man. Then the funniest thing happened. A wee voice said, "Why don't you put *me* in?"

Right away the little gray squirrel hopped right into his place in the puzzle. Then all the funny-shaped animals and stars and trees went dancing around and around the table. Even the apples and pears came rolling and bumping along behind, all the while singing a silly little song like this:

"Calvin doesn't know where I fit
Where I fit—
Where I fit—
Calvin doesn't know where I fit
Oh—He's a funny boy! ! !"

Then the gingerbread man called off all of their names. As he named them each hopped right into his proper place, leaving just one hole in the very center of the puzzle for himself.

After all had danced and hopped into place Calvin put the gingerbread man into the very middle where he belonged and the puzzle was complete. And once they were in their places in the puzzle they were all very, very quiet. They fit together like a happy family, even though the bear cub and the cat were close together.

Just then Great-aunt Mary came into the room and what do you suppose she found? Little Calvin was sound asleep with the fat-legged puppy in one hand and the gingerbread man tightly grasped in the other!

ADOPTED CHICKS BY BOYCE LURZ

MABEL was a goose, a nice white goose. She lived in our farmyard. One day she seemed very much worried. After a while I found out what was bothering her. She had laid her eggs but they did not hatch. She tried her best to produce little goslings from the eggs but something was wrong. She seemed to have set her heart on a family, so I gave her one. The family was six little barred rock chicks. Mabel adopted them and cared for them. All but one grew up and she was as proud of them, although they did not look anything like her. She raised them as though they had been the goslings she had tried four weeks to hatch from the eggs.

WILDCAT PETS

BY RALPH H. ANDERSON

PETER TOPP, manager of the Yosemite National Park Fish Hatchery, has long been a Nature lover. His winter feed table for birds and animals has brought many friends. Ring-tail cats, skunks and squirrels visit him, and coyotes have come to his back door for food during heavy winter storms. Then I heard Mr. Topp had made friends with a full-grown wildcat and kitten. So I called. Mr. Topp opened the kitchen door and shouted, "Kitty, kitty, kitty." The two wildcats knew that meant fresh meat scraps. They came in a hurry, a stocky wildcat more than two feet long and weighing at least fifteen pounds, then mother, more sleek, a trifle larger and darker in color.

"Yesterday the kitten turned against her mother and gave her a sound beating," said Mr. Topp. "Until today the mother earned the greater part of the food, but the kitten became a grown-up wildcat."

For several weeks the wildcats came to the fish hatchery for their daily ration of fresh meat. The Topp youngsters loved the animal show each afternoon as soon as they had returned from school. As the heavy snow pack melted away and more small animals appeared the cats came less often.

THE DANDELION'S PARACHUTE

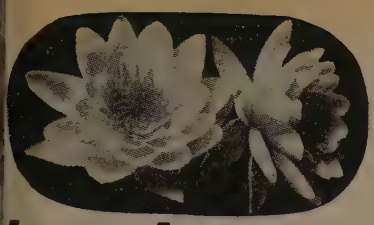
FLORENCE H. MOORE

Sunny Sunbeam strayed one day
And splashed upon the ground;
And spread a yellow blanket,
With dan-de-lions all around.

And then some little parachutes,
Went sailing in the air,
As if to meet some tiny planes,
Awaiting them up there.

But they are only carrying
Their little seeds away,
To spread more yellow blankets,
Where other Sunbeams play.

PUZZLE: Find Old King Sol and little Sunny Sunbeam.



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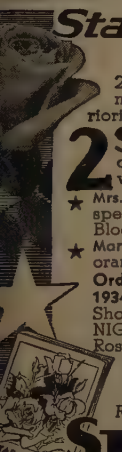

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DEALING WITH SEEDS

(Continued from page 87)

treat seeds with one of the new organic mercury disinfectants. All that is necessary is to place a tiny pinch of the powder in the seed packet and shake thoroughly. Ansul and similar compounds disinfect the soil. The cost of such materials is so little, and their use such slight trouble, that it pays to employ them even though good results are often obtained without. They eliminate or greatly lessen the danger from the "damping-off" diseases, the most universal danger to which seedlings are subject.

Hard seeds, and those which germinate slowly, may be soaked from twelve to forty-eight hours in lukewarm water before planting. They should be sown after the seeds swell, but before they actually sprout. This treatment will hasten germination and make it much more even.

The seed may be sown either broadcast, or in rows two to four inches apart. Three inches will be sufficient for the average run of flowers and vegetables. Ordinarily it is better to sow in rows. One common mistake made in sowing is to cover the seeds too deeply. Fine seed, such as that of begonias, should be merely dropped on the surface and pressed firmly into the soil. Larger seeds, such as those of most flowers, should be barely covered from sight; and still larger seeds, which are of an appreciable diameter, about twice their greatest thickness. Broad, thin seeds, such as those of the cup-and-saucer vine, *Cobea scandens*, are best inserted edgewise. Do not sow too thickly: ten to twenty seeds to the inch with small seeds, and five to ten of larger seeds, is sufficient.

The importance of maintaining a *constant* supply of moisture has already been emphasized. From the time the seeds are sown until they are well sprouted, never let the surface of the soil become dry. With seeds sown indoors or in a frame, the surface can be kept constantly moist by placing a pane of glass over the seed-pan or flat, leaving just a crack for the admission of air. For larger surfaces, such as the outdoor seed-bed, a piece of burlap, kept constantly moist, will accomplish the same purpose. In either case, remove the covering immediately the seed germinates. A single day's delay in doing this will be sufficient to cause the seedlings to "draw up," and make them weak and spindling.

Until the tiny seedlings acquire some size and strength, watering must be done with the utmost care. A fine syringe or sprayer is good for this purpose. Still better, however, is to place the seed-pan or flat in some larger container, so that the soil can soak up the water from the bottom. This assures absolutely thorough watering, without any danger of disturbing the surface, or knocking down the tiniest seedling. The appearance of moisture on the surface shows

(Continued on page 99)

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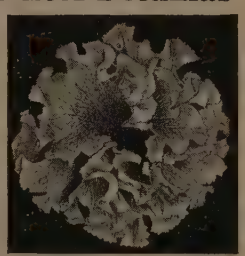

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DWELLERS IN THE DESERT

(Continued from page 68)

of the moths, but all living on insects, mostly taken from the air, and many of them our worst pests. Without stopping to count them, I should estimate there were thirty kinds of bats in the arid southwestern part of the United States, all with different habits and with ranges fitting into every nook and corner where they can find a place to stay and food to eat and water to drink.

Bats are thirsty animals and must have water once or twice every night. They are hearty eaters and hearty drinkers, and after sleeping all day in dark retreats in caves or cliffs or building they seek the nearest water, be it miles away, and dipping over the surface drink on the wing repeatedly until satisfied. Some of the strong-winged species are found many miles from water or else they know where to find it in tanks or pools that we do not find. Every waterhole in the desert is a nightly center for bats, and often they swarm like dragon flies over still pools, before circling away to feed among the tree tops or along the cliffs or low over the bushes of the desert. Different species find their favorite prey in different haunts, and while the beetles and moths and flying bugs of their menu are not exterminated, their numbers are reduced by tons and tons as shown by their remains in the bat guano in caves or other roosting places.

But dollars and cents saved us by the bats do not measure their whole value. Some day we will learn that they are mammals like ourselves but of a more ancient and highly specialized group. They learned to fly before we began to try to learn and could teach us much about navigation of the air and taking advantage of air waves. They have developed their own power in their pectoral muscles which are not greatly beyond what we might develop if we used our intelligence.

Bats too are intelligent, far more than we generally credit them as being, and make most interesting pets for study. Fortunately their skins have no commercial value and they are not likely to be exterminated, but often their roosting or breeding colonies do need our protection and should have it, for bats are among our best friends.

TREASURE CHEST OF AMERICA

(Continued from page 72)

grew millions of years ago are transformed to lasting wood-opal, yet retaining the cellular growth lines. Another somewhat similar deposit was near Whitehall, at the top of the divide, east of Butte.

Washington County, in Idaho, furnishes some nice blue azurite and green malachite, cinnamon garnets, and "copper emeralds." But probably the most startling thing is a plate of pure gold found in malachite! Nature has played some queer pranks, but of them all this is one of the most strange. Raw gold in copper carbonate!

The Rockies!—the treasure chest of America. Love the Alps if you will; extol the Apennines if you must; prate of the Himalayas; but, as for me, I will center all my affections on our own lovable, indispensable, rugged Rockies.

BIRDS OF THE SOUTHWEST

(Continued from page 80)

songs of rosy house finches, and the soft *tu-whit, tu-whit* of the plain titmouse, while from outside comes the emphatic talk of the valley quail, and from the chaparral-covered hills the delicious *keep, keep, keep, keep, keep-it, keep-it, keep-it, keep-it* of the mysterious wren-tit. Hanging from the branches of smaller oaks may be found the long bag nests, marvels of industry, of the tiny bush-tits which gather innumerable bits of moss and oak blossoms for nest walls and line these tirelessly with little feathers.

In the towns of southern California the black, crested phainopepla or silken flycatcher, showing white wing patches in flight, may be seen decoratively leaning over clusters of pink pepper berries much to its taste; the light yellow and black Arizona hooded or palm-leaf oriole may be seen flying to its palm-fiber nest hanging under a palm leaf; the striped cheeked western lark sparrow may be seen not only in orchards but on lawns where the pale-eyed Brewer blackbird walks about oblivious of passersby, at night retiring to a crowded roost perhaps in a cypress by the sidewalk.

Between towns, as you motor along, unexpected alkaline lakes may halt you to gaze in admiration upon the striking forms of long-legged waders—the cinnamon and white avocet with its long upcurved bill, the pink-legged black-necked stilt raising its pointed black wings high over its back on alighting, and perhaps a picturesque flock of chestnut and green white-faced glossy ibises, circling around showing the long decurved bills best for their uses. If it is in the nesting season the stilts may delay you still longer by an exhibition of their pitifully distressed but amusingly acrobatic decoy.

Rare tule marshes afford nesting sites for the widely-known red-winged and yellow-headed blackbirds, rails, coots and fiddling marsh wrens, while the large alkaline lakes of the Southwest attract many ducks and other migrating birds common to the country at large. Irrigated alfalfa ranches, when the water is turned on, show a surprising population of migrating shore-birds also found along the Pacific beaches, together with innumerable other water fowl.

In the interior, when journeying through the extensive orchard-like nut pine and juniper belt of the arid West, the most pervasive and characteristic bird is the blue, short-tailed pinyon jay, which nests in the pinyon and juniper and lives largely on their nuts and berries. As springs and water holes are widely separated in this arid region, the birds go long distances through the miniature forest in search of them. At one spring in New Mexico, where we camped overnight, thousands must have come and gone during the few daylight hours, their soft *pin-yoney, pin-yoney* filling the air.

Above the oaks, nut pines and junipers, few birds are peculiar to the Southwest, most of them being found in their respective zones throughout the higher mountains of the West. But typical birds of the sagebrush tracts are the sage thrasher, Brewer, sage, and western vesper sparrows; of the yellow pine belt, the Merriam turkey, band-tailed pigeon, the pygmy and other owls, Lewis' woodpecker, poorwill, black swift, black-billed magpie, northern violet-green swallow, pygmy nuthatch, and russet-backed thrush.

Above the yellow pines and sagebrush [illegible] the descriptively named Transition Zone you come to the firs, spruces, and aspens [illegible] Canadian Zone, some of whose characteristic birds are grouse, Williamson's sapsucker, three-toed woodpecker, calliope hummingbird, western evening grosbeak, green-tailed towhee, the kinglets and the most notable of all our songbirds, Townsend's solitaire and the hermit and varied thrushes.

Higher still, in Hudsonian Zone, you find such hardy birds as the Clark crow, Rocky Mountain jay, white-crowned sparrow, and the Rocky Mountain pine grosbeak; while highest of all in the Alpine Zone in certain favored spots in New Mexico you may find a few ptarmigan and occasionally a flock of rosy finches.

With all these and many more possible acquaintances among our most interesting birds to call him, no wonder that the bird lover is eager to visit the fascinating desert and mountain lands of the Southwest!

HIDDEN VALLEY

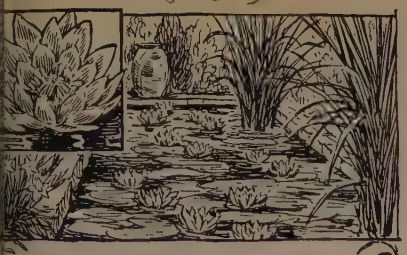
(Continued from page 83)

deep with dust which rose in choking clouds at each step. No rain or snow had entered here for century after century since the last cliff dweller had left. I moved several metates or corn-grinding stones from the back of the hollow cliff and piled them near the doorway. With a stick from the pack rat's nest, I stirred deep in the dust on the floor, breathing as best I could through a handkerchief. The stick brought up whole handfuls of basketry fragments of split willow, and bits of tanned deerskin, and even an old sandal made of twisted fibre, all preserved in the arid dust. As my excavation grew deeper, I found an arrow shaft with the obsidian head yet bound on it and a grooved lump of lava with which the shaft had been polished. Pottery fragments and more obsidian slid out of the dust of the pile as I worked.

By late afternoon I had cleaned and scraped away the dust down five feet or more in my excavation and in the very bottom there yet continued the basketry and bits of charcoal of the ancient cooking fires. Long ages had passed since those ashes at the bottom had lighted up the Hidden Valley.

The short bark of the coyotes on the cliff warned me that I was an intruder in the cave of the ancestors of the Piutes. I rolled a great fragment of rock fallen from the roof of the cavern into the hole and slipped over the edge of the terrace, down the crevice rock ladder as though escaping from burglarizing a cabin. I fairly ran down the rest of the slope, stumbling and choking the dust from my lungs.

Down through the valley the sun was glinting from the great lava cliffs and the burros were a little group of black spots in the shadow. Deep Springs John was right. The spirits of the ancient men of Hidden Valley were reincarnated in the coyotes which howl in the evenings from the cave on the cliff.



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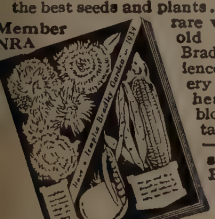

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(Continued from page 97)

when the soil is wet through. I always use this method with very fine or difficult seeds. Some fine seeds require a long time to germinate, and constant moisture without frequent watering can be supplied these by surrounding the container with sphagnum moss or peat-moss which is kept wet.

Keep the temperature as constant as possible by providing ventilation if the seeds are being started indoors, or shade when they are sown out-of-doors in hot weather. In the latter case the shade should be placed somewhat above the bed, so there will be free air circulation underneath.

The seedlings should in most instances be transplanted just as soon as they are large enough to handle. The various factors involved in successful transplanting will be discussed in a following article, dealing with the making of new plants by means other than growing them from seed.

Running Flower Shows

Here is a helpful and valuable booklet. It is entitled *Flower Shows: Their Organization, Management and Judging.* It is the work of Victor H. Ries, assistant Professor of Floriculture at Ohio State University, and is brought out by the Ohio Association of Garden Clubs. The collaboration has resulted in a document which should find a hearty welcome from garden organizations everywhere. In going through this booklet we should say that the author has overlooked no essential detail of the work of planning, running and judging flower shows. It is a triumph of completeness and concise presentation. It is a much-needed contribution. Copies may be obtained for fifty cents, postpaid, from Walter A. Tucker, secretary of the Association, 728 South Remington Road, Columbus, Ohio.

Birds à la Mode

Modes appear to travel in cycles and the millinery vogue appears to be for bird feathers. It hasn't got quite back to "the saucy little bird on Nellie's hat," but wild bird feathers are appearing again on milady's bonnet. Noting this, Winthrop Packard of the Massachusetts Audubon Society has sent a friendly warning to all Massachusetts milliners, pointing out that the law of the State prohibits the wearing of the feathers of any bird protected by law. He also cites the provisions of the Migratory Bird Treaty Act as well as the Tariff Act of 1930, both of which contain specific regulations against bird feather traffic.

More on Mosses

Dealing with the Grimmiaceae, Volume II, Part I, of *Moss Flora of North America* has been brought out by A. J. Grout at Newfane, Vermont. It is the work of George Neville Jones of the University of Washington, with whom Mr. Grout has collaborated as editor. This is valuable material for the botanical student.

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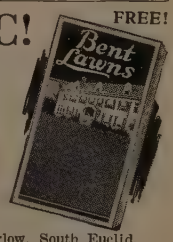

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HUMANE TRAPS

(Continued from page 91)

together in top of can, and drop a wire down through them, with one short and one long arm. Make a short hook on the short arm to catch and hold up the edge of the door, and bend the long arm back and across the floor of the trap so the animal in going in to reach the bait touches the cross bar with its back and springs the trap behind it.

Another kind of trigger can be made from a coiled wire with a gooseneck at one side like that in the bottle trap, the door held up on the tip of the hook, or bill, of the gooseneck, and the bait placed on the erect pin of the wire coil.

Set the tin can trap near a hole or runway and scatter rolled oats or other bait in front of and leading into the trap to the real bait of half a peanut meat, bit of bread and butter, or bit of fresh apple, prune, or raisin on the trigger. Vary the bait according to taste of the animal to be caught, but adjust the trigger so the least touch on the flat coil of wire at the base will spring the trap. Sometimes an animal will not eat the bait but may be caught by walking on or under the trigger.

Another way is to run a thread or very fine wire from the hook in top of trap through a hole or loop at the back of the trap, and fasten a nut or string of sunflower seeds to the end so that a pull on the nut or seeds will drop the door behind the animal. In these can-traps plenty of food and a bit of soft bedding will keep the mouse comfortable until you come and get him in the morning.

Doctor Bunnell, a busy California surgeon, puts a week's supply of nest, food, and water in the trap so he will find the occupant comfortable when he returns at the next week-end.

Instead of the tin-can trap a strip of quarter-inch wire mesh rolled into a cylinder, and then pinched into a square of any desired size or shape, makes an excellent trap for some animals. One end can be fitted with a square of the same netting, wired in, and the other end supplied with a swing door of stiff tin or galvanized iron, hung at the top with wire ring hinges, and supplied with a stiff wire from the bottom of the door and a sharp notch at the top to catch and hold when the door is down. The triggers can be as in the tin-can trap, or a variety of other wire types. This trap can be varied to larger size with one-inch mesh chicken wire for squirrels or woodchucks, or even for skunks, cats, and raccoons.

In cold weather these wire traps do not protect the animals, which often get badly chilled while sitting still all night unless plenty of leaves and grass are where they can draw them into the trap and make a comfortable nest.

Simplest, and best of all traps for catching small mammals alive and keeping them comfortable, is the *Milk Bottle Trap,* invented for some young friends of mine who bring me live mice of many interesting kinds.

Cut a piece of wire mesh one inch wide and three and a half inches long; bend over an inch at one end; slip the long end into the mouth of a milk bottle with the short end over the rim outside and put one or two small rubber bands around this short end and the neck of the bottle.

For a trigger cut a piece of No. 16 wire eight inches long, and bend a gooseneck in one end and in the other bend the wire twice around in a double circle that will lie flat in the bottle while the gooseneck stands up. Raise the wire mesh door in the bottle neck with the right forefinger and slide the trigger forward in the bottle until the tip of bill of the gooseneck comes under the edge of wire door and holds it up. Place the trap where the mice come and sprinkle rolled oats in front of and in the trap so that the mouse will follow the bait in and step on or move the trigger until it flies from under the wire door, and he is caught inside. A seed or nut on the turned-up tip of the wire inside increases the chances of capture.

The mouths of large and small milk bottles are generally the same size, and the same wire and trigger can be used in any of them. The pint and half-pint bottles are large enough for mice and shrews, and for larger animals large-mouthed pickle bottles, fruit jars, or even tin cans and boxes can be used in the same way. Strips of tin can be used in place of wire mesh and cut and bent to fit any sized bottle, can, or box.

Many types of traps for taking muskrats alive have been made, and some fairly good traps are on the market. Other very simple home-made traps are fairly successful in certain localities. None of these will operate satisfactorily under all conditions, or in all localities, for some muskrats live in deep water, others in relatively dry marshes, some in bank burrows and others in houses built in shallow water.

One trap that has proved fairly successful and is easily made is illustrated here. It is so simple that it was not considered patentable, but it can be easily made at home at slight expense. There is a great saving in taking muskrats alive so that the young and some females can be released for next year's crop.

Some dozen years ago a beaver trap was needed for taking beavers alive where they were flooding land or damaging property and removing them to places where they would be useful and do no harm. A simple cage trap was made and set under water and many beavers taken and moved from place to place. The trap was patented by the U. S. Department of Agriculture so it could be made for use or sale by anyone, and many are now in use in most of the States where there are beavers, as well as in Canada and several foreign countries. The trap has served a useful purpose in conservation, and has helped us to a better understanding of the interesting habits and responsive natures of beavers.

Catching the animals is only the first step. Keeping them so they will be happy and healthy under approximately normal conditions is not difficult but requires care. Unless they can be made comfortable and contented it is better to leave them in their native haunts where they can live their own lives in their own way, as we all like to do.

A simple inexpensive cage for mouse-sized animals can be made of a strip of quarter-inch wire mesh, nine inches wide and forty-five inches long, folded into a hollow square, to fit inside of a 10″ x 12″ baking dish of tin or black iron; then a piece of the same wire mesh is cut for a top, hinged at one side with wire rings and the edges bent down a half inch over the ends and front for a cover. A nest box, food and water dishes, and a wheel should be provided in the cage, and plenty of clean sand or earth in the bottom of the tin dish. Other sizes and shapes of cages can be made in the same way.

Wheels can be made in two ways—upright hollow wheels that revolve as the animals run around inside of them, and inclined discs. For small animals the hollow wheel should be made of two- or three-inch strips of window screen folded in a 6- to 10-inch circle, with two cross braces at each edge, and made to revolve on a wire axis across one end of the cage. The wheel should be carefully made and the axle centered so it will run smoothly. Mice, chipmunks and ground squirrels, as well as tree squirrels, become absorbingly fond of these wheels.

A simple type of wheel enjoyed by most small animals is a circular disc of thin wood with an inch block underneath in the center, through which a small hole is bored or drilled in the exact center of the wheel at right angles to the surface. A bit of tin should be nailed over the top of this hole, and the wheel dropped over the tip of a long wire nail set obliquely up through the baseboard. The wheel then rests with one edge an inch or inch-and-a-half higher than the other, and animals soon learn that by running up one side of the inclined wheel it spins rapidly under them. They become very expert in spinning this wheel and get great enjoyment and keep in a healthy condition by the exercise.

With a good variety of food, clean water, and wheels for play and exercise most of the little wild animals of mouse, rat, and squirrel size are happy and contented in a cage, and soon lose their fear of the outside enemies that are always trying to catch and eat them in their wild state. When they learn not to be afraid of us, and to expect food and care from our hands, we learn much of their habits and natures that can be gained in no other way. Often they are found to be far more intelligent than is generally thought; or, in other words, we are not half so superior to our four-footed kin as some of us suppose.

The Desert Garden

This is the title given by Frances L. Hamilton to her little book dealing with the native plants of Phoenix, Arizona, and its vicinity. This publication should be of value to anyone with some background of method in botanical identification. It is not a descriptive text aimed at the layman. Copies of the booklet may be obtained from the author at 909 North 7th Street, Phoenix, Arizona. It is one dollar plus postage.

Anti-decoy Slogan

"Live Decoys Are the Marked Cards of Cheaters" was the slogan selected by the judges in the anti-decoy slogan contest conducted by the Emergency Conservation Committee. The award was made to Rose A. Leigh, who promptly returned the check to be applied to the educational work of the Committee. This slogan will be a companion one to that against baiting, which declares: "Baiting Is Murder from Ambush."

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Fresh Water Algae

All lovers of the out-of-doors and particularly its plant life will feel deeply indebted to Dr. Gilbert M. Smith of the Botanical Department of Stanford University for his newly issued work entitled *Fresh-Water Algae of the United States*. For more than a quarter of a century lovers of plant life in America have had to depend to a large degree upon German and British scientists for information bearing in a technical way upon these fresh-water algae. Every one of these sorely tried people will welcome a moderate-priced single volume on the subject. It has been prepared with a twofold purpose: to enable Nature students quickly to identify their findings in fresh-water algae, and to summarize the available information on the structures and the life-histories of the various common kinds of algae. All of the genera found in this country have been studied in detail and an illustration is given for one or more species of each. A general key has been provided and has been so constructed that vegetative characters are utilized as far as possible. Consideration is given to such themes as the nature, evolution, and classification of various kinds of algae, the distribution, occurrence, collection, preservation and methods of studying fresh-water algae. The various subdivisions of the subject include detailed information regarding the blue-green, the red, the yellow, the golden brown, the grass-green, the yellow-brown algae and the diatomes. There are characterizations of the more important species of each genus, keys to orders and families, and extensive references to the literature are given. The book will be extremely useful to all who are really interested in the subject. The book is published by McGraw-Hill and sells for six dollars.

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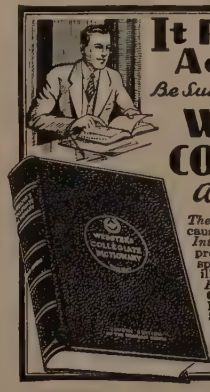

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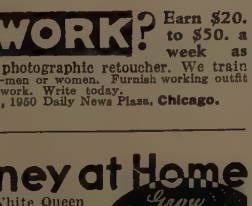

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Warren Ticknor of Ellenburg, Washington, and a buddy were camping in a canyon. A dressed chicken that had been kept for four days turned out to be far from edible and the bacon diet had been so heavy that it was not alluring. "There's our dinner," said Ticknor's friend, pointing to the freshly-skinned carcass of a Pacific rattlesnake whose hide had been taken for a belt. Ticknor says that the meat was clean and white and odorless. So they cooked it without onions or sauce to get the true taste. He reports it tasted more like chicken than fish, and says that while he doesn't recommend a rattlesnake diet it serves well in an emergency.

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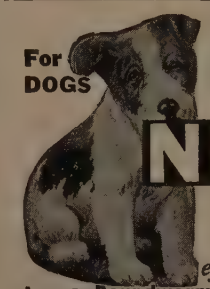

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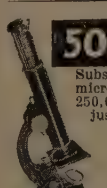

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A Fine Dog Story

Hugh King Harris has written a dog story and given it the title of *Pepper,* the name of his central dog hero. It is the story of a boy and his dog, and of boys and their dogs. The publishers regard it as the *Black Beauty* of the dog world. This equine classic was one of the poignant literary experiences of our youth and we have come to regard it as incomparable. It has been a long time since we read it and we do not recall whether Black Beauty, as a leggy colt, knew a Percheron from an Arabian when he saw it, but we do know that Pepper, as a mere puppy, immediately knows an Airedale from a Scotty. In other words, the story is told by Pepper whose worldly knowledge is greater in many directions than that of his master; he seems to have been born that way. This may be carping, and we have to admit that we read *Pepper* with sustained interest. Its author obviously has much understanding of dogs and a valuably constructive viewpoint about their care and training. These he has woven into his story, giving it a value that obscures a few mental anachronisms. The kids will love the story, and you'll get a tear or two out of it yourself after the kids have gone to bed. Lothrop, Lee and Shepard publish the book and it sells for $1.50.

Vernon Bailey Again

The tremendous quantity of interesting and valuable research work turned out year after year by Vernon Bailey has long been a matter of wonderment to his associates. The latest volume from his pen, which has just appeared, is entitled *Cave Life of Kentucky, Mainly in the Mammoth Cave Region,* and proves to be eminently worthy of its long line of predecessors. Issued by the University Press, Notre Dame, Indiana, at $1.25 in cloth, the introductory matter comprises such subjects as history and prehistory, roads and rivers, research and education, vegetation and ecology, also game and wild life. Detailed discussion follows of the mammals, fishes, reptiles, amphibians and invertebrates of the caves or of the cave region. One of the most useful sections is that on the birds of the cave region by Mrs. Florence Merriam Bailey. The list of references to supplementary reading enables the reader readily to continue study of any phase of the subject in which he may be interested. The book is a most useful one and is certain to attain a popularity far beyond the comparatively local range of the studies made.

Land of Enchantment

The varied and abundant flora and fauna which occur in the two great life zones, the Lower Austral and the Tropical Zone of Florida, render it a veritable land of enchantment to countless numbers of Nature students. All such will hail with genuine enthusiasm the newly issued volume by Dr. Willis Stanley Blatchley entitled *In Days Agone.* Presented in the form of a daily journal it contains detailed account of six extensive expeditions made by the naturalist around Cape Sable and Lake Okeechobee. Not only are there quite full discussions of the itineraries, the equipment, the land and water areas covered, the weather and c mate, the lakes, the streams, and the ec nomic status of the State over a period years, but there also are given full no with both common and scientific names the habits, local distribution and know range of 63 species of birds, 22 reptiles, fishes, 266 beetles, 23 butterflies, and 12 flowering plants either collected or note on these trips. Written by an old-time natu ralist, who is deeply interested in ever phase of natural phenomena, and couche in language, the very memory of which leave a haunting melody, the book possesses s charm and a fascination which reminds or instinctively of some of the better passage in the writings of Gilbert White, Richar Jefferies, Henry Thoreau, John Burrough John Muir and Bradford Torrey. The vo ume represents a real contribution to Na ture literature, makes thoroughly delightfu reading, and is certain to attain wide popu larity in the years to come. It is brought ou by the Nature Publishing Company, Indiana apolis, Indiana, for two dollars.

California Deer

A splendid addition to the Occasiona Papers published by the Santa Barbara Mu seum of Natural History is *The Deer o California* by H. H. Sheldon, formerly fiel naturalist with the United States Bureau o Biological Survey. This is an authoritativ and interestingly presented study of the dee of the Golden State. The text is abettec by a number of excellent and descriptive illustrations. Copies of the report may be had from the Museum at $1.50.

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WHAT THE NAMES MEAN

Last month we presented the first of a series of analyses of scientific names, these studies being prepared by the members of the Junior Science Club of the Latin Department of the Abraham Lincoln High School in Brooklyn, New York. Here are three more this month dealing with the Arizona round-tailed squirrel (Page 64), the creosote bush (Page 74) and the cactus wren (Page 76).

ARIZONA ROUND-TAILED SQUIRREL—*Citellus tereticaudus arizonae.* This squirrel has characteristics worth studying. First it is a small (*ellus*) quick (*citus*) animal. Some ground squirrels are classified in the genus *Citellus*. Then in contrast with others, the round-tailed squirrel has a thinner, round tail, as if the fur had been rubbed off smooth (*terere,* to rub smooth).

This little animal is found in Arizona and neighboring states where it lives in natural or burrowed holes. Like other squirrels it feeds on herbs and seeds; it was once referred to the genus *Spermophilus,* the Greek for "lover of seeds."

There are other interesting English words from the same roots. In the shoulder we have two terete muscles, which are rounded and smooth. Various insects have a *terebra* (for *terere* also means to grind), with which the insect punctures the places in which the eggs are laid. The ship-worm, "conspicuous for the destruction which it occasions to ships and submerged wood," is called *teredo.* A *trite* statement (from the same *terere*) is one that has been used till it is worn out, or rounded off till it has lost its point, and the *contrite* heart of the Psalms is bruised and penitent.

Caudisona, from the Latin for tail and sound, is a genus of rattlesnakes, so called because of the sound they produce with the tail. A *coda,* also from cauda, is a passage added like a tail to a musical selection to make it complete; and a *codicil* has been added in the same way to a will.

IRVING FINKLESTEIN.

CREOSOTE BUSH—*Covillea glutinosa.* The creosote bush has a strong, heavy, tarry odor like creosote. The Mexicans call the shrub *hediondilla,* "the little bad-smeller." The Latin name for the plant is *Covillea glutinosa.* If we dissect this seemingly long name, we understand why the scientists gave it. The first part, *Covillea,* was named for F. V. Coville, an American botanist. *Glutinosa* is Latin and means sticky, like glue. The leaves are resinous. Resin is a sticky vegetable substance which oozes out from certain plants and trees and then hardens.

We have many words associated with *glutinosa,* among them glue and gluten, the sticky part of flour. Agglutinin is a substance manufactured in the body, which causes the germs of typhoid fever to stick together in clumps so that they may be devoured by the white blood corpuscles.

The leaves are *zygophyllaceous* (pronounced zīgō-). Don't be frightened; all this has a meaning. We have *zygon,* yoke, and *phyllon,* leaf, from Greek. The Latin *jugum* and English yoke may both refer to a pair of animals working as a team. The leaves extend opposite, in pairs. The *phyll*—we have illustrated in *chlorophyll,* the green coloring matter of plants. You see after all that all these names which seem difficult to understand have their sensible and perfectly clear meanings.

Therefore, the creosote bush is a shrub with a heavy, strong odor, named for F. V. Coville; and has resinous leaves extended in opposite directions, paired off like a yoke of oxen.

EDWARD BRANDSTATTER.

CACTUS WREN—*Heleódytes brunneicapillus couesi.* Cactus wren is the name given to certain wrens in the southwestern United States. The word *cactus* is Greek, and means a prickly plant. The genus formerly used was *Campylorhynchus,* from *campylos,* curved, and *rhynchus,* snout or beak; and we learn, from the two parts of this Greek name, that it has a curved beak. The upper parts of the birds of this genus are brownish, but when we see *brunneicapillus* applied to one species, we know that this is a brown-headed creature, for *capillus* means hair and *brunnei* brown. The bird's picture shows the head darker than the back.

Altogether we have learned that *Campylorhynchus brunneicapillus* has a curved beak and a brown head, but why is he now called *Heleódytes* and *couesi?*

This subspecies was named in honor of Elliott Coues, an American naturalist, whose name (in the Latin genitive case to show possession) has been given to the bird. We are not sure of the derivation of the genus *Heleódytes.*

There are other interesting words connected with these. *Campylotropal* describes a seed, curved almost to a circle, with the apex close to the base. In the dictionary we find forty or more birds, beasts, insects and fishes with *rhynchus* in the name, so you see the wren has many comrades, even if they are not relatives. The Troglodytes or cave-dwellers have been men and apes, as well as birds. In English, Bruin referring to a bear is connected with brown and *brunnei.*

The editor wrote that he was sending us "dandy names," but it might be a surprise to him and to Brown University students to learn that the name on their college seal has any connection with Bruin, the cactus wren and the dark-complexioned ladies called brunettes.

NORMAN LOBEL.

The work of compiling these analyses has been teamwork so far as research is concerned, with Marvin Miroff and Abraham Schwartz carrying a large share of the burden, aided by the members of the class who contributed analyses in the January issue of Nature Magazine.

Three Bold Bathers

"One Sunday morning in Philadelphia, late in November," writes the Rev. Zed H. Copp, "when the sky was overcast with billowy clouds and a moderate northwest wind made brisk walking necessary, a brief rift in the cloudy canopy made a shimmering sheet of a shallow pool in the pavement filled with raindrops from the night before. Into this ocean, without lifeguard and without so much as, 'By your permission, please,' three bold bathers, in suits for the occasion, hopped cheerfully, bantering each other as they dipped into the icy water, ruffling their feathers. They were English, don't you know?"

TRAVEL SERVICE

WITH this issue we announce a new service to the subscribers of Nature Magazine; a Travel Bureau for the purpose of giving suggestions, advice, and information to readers planning trips, tours, cruises, etc.

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On March 28, 1933, Uncle Sam's mails carried a letter mailed from Battle Creek, Michigan, addressed to a Canary Bird at Miami Beach, Florida. Here is what the letter said:

To the little Canary Bird in Apt. 31:

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So, even though I do not know you or your folks, I wanted to give you a few minutes of pleasure in payment for all the pleasure you gave us. And we thank you for your happy songs.

Sincerely,
(Mrs. L. B.)

The letter contained a fancy bird biscuit.

A Skunk Story

It was Sunday morning and the family was on the way to church, writes Elizabeth Bolton of Westport, Connecticut. En route they came upon a little group standing by the main highway watching a skunk that had somehow gotten its head stuck into a tin can. One member of the group, hoping the skunk would be able to get loose, was directing the traffic around it. None dared to try to pull off the can, fearing the skunk's best weapon. But, even though it must have been frightened by this predicament, the skunk did not bring its odor into action. Finally, however, after all the bystanders had voiced theories about skunks and their habits, it was decided that the only humane course was a bullet.

Chipmunk and Sparrow

"At Bear Lake, one sunny afternoon in July," writes Alice Humphrey in *Nature Notes* from Rocky Mountain National Park, "a chipmunk suddenly came upon a choice morsel of food. He pounced upon it delightedly, got a firm hold with his tiny teeth, and began bouncing away hurriedly, no doubt seeking some spot of sure safety where he could devour his prize in peace. Simultaneously sweet music in a near-by spruce tree ceased, and an envious song sparrow swooped down upon the bouncing chipmunk. Three times the sparrow attacked the little fellow before he lost his chipmunk temper and saw red. He turned suddenly upon the sparrow, laid his food aside for the moment so that he might be unencumbered during the return attack, and 'made for' his winged enemy viciously, rage shooting from both eyes. The clever sparrow, no doubt thinking of the fable of the Fox and the Crow, fluttered frightfully with the chipmunk at his very heels for some distance. Then he turned abruptly and darted gracefully and swiftly back to the food, which he had carried almost to the top of a tall tree before the chipmunk had time to realize what had happened. The chipmunk looked like a small boy who had just spilled ice cream out of his cone onto a hot and dirty sidewalk."

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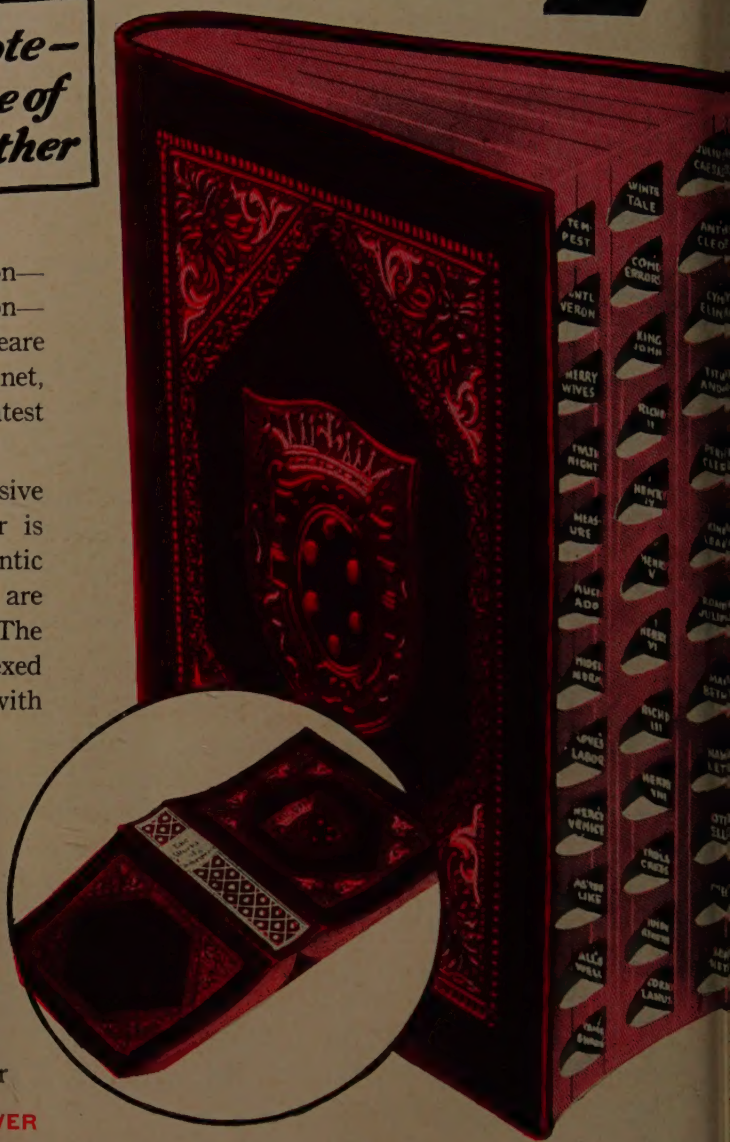

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